

ENVIRONMENTAL ASSESSMENT

**REDUCING MAMMAL DAMAGE
IN THE
STATE OF INDIANA**

FINAL

Prepared By:

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ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES**

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SUMMARY OF PROPOSED ACTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) proposes to continue the current damage management program that responds to mammal damage in the State of Indiana. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce mammal damage to property, agricultural resources, and natural resources, reduce adverse impacts on human and livestock health and safety, and to obtain samples for surveillance of wildlife diseases. Damage management would be conducted on public and private property in Indiana when the resource owner (property owner) or manager requests assistance or when assistance is requested by an appropriate state, federal or local government agency. The IWDM strategy would encompass the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, non-lethal methods like physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, mammals would be removed as humanely as possible using shooting, trapping, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy. WS involvement in mammal damage management in Indiana is closely coordinated with the Indiana Department of Natural Resources (IDNR). All WS actions are conducted in compliance with applicable Federal, State, Tribal, and Local laws, regulations, policies, orders and procedures.

ACRONYMS

ADC ¹	Animal Damage Control
AMDUCA	Animal Medicinal Drug Use Clarification Act
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BO	Biological Opinion
MDM	Mammal Damage Management
CDC	Center for Disease Control and Prevention
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWD	Chronic Wasting Disease
DEA	Drug Enforcement Administration
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FMD	Foot and Mouth Disease
FY	Fiscal Year
IAC	Indiana Administrative Code
IC	Indiana Code
IDNR	Indiana Department of Natural Resources
ISBAH	Indiana State Board of Animal Health
IWDM	Integrated Wildlife Damage Management
MBTA	Migratory Bird Treaty Act
MDM	Mammal Damage Management
MIS	Management Information System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notices of Availability
NRCS	Natural Resource Conservation Service
NWRC	USDA, APHIS, WS, National Wildlife Research Center
OISC	Office of the Indiana State Chemist
ORV	Oral Rabies Vaccination
PRRS	Porcine, Reproductive and Respiratory Syndrome Virus
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
TB	Tuberculosis
TGE	Transmissible Gastroenteritis
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
VS	Veterinary Services
WDM	Wildlife Damage Management

¹ On August 1, 1997, the Animal Damage Control program was officially renamed to Wildlife Services. The phrases Animal Damage Control, ADC, Wildlife Services, and WS are used synonymously throughout this Environmental Assessment.

WS¹
ZnP

Wildlife Services
Zinc Phosphide

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with the needs of wildlife which increases the potential for conflicting human/wildlife interactions. Human/wildlife conflict issues are complicated by the wide range of public responses to wildlife and wildlife damage. What may be unacceptable damage to one person may be a normal cost of living with nature to someone else. The *Animal Damage Control Programmatic Final Environmental Impact Statement* (EIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way (United States Department of Agriculture (USDA) 1997 Revised):

"Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally regarded as providing economic, recreational and aesthetic benefits . . . and the mere knowledge that wildlife exists is a positive benefit to many people. However . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and values is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural and economic considerations as well."

Wildlife damage management (WDM) is the science of reducing damage or other problems associated with wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1992). The USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program uses an Integrated Wildlife Damage Management (IWDM) approach (WS Directive 2.105²), in which a combination of methods may be used or recommended to reduce wildlife damage (USDA 1997 Revised, Chapter 1:1-7). These methods may include non-lethal techniques like alteration of cultural practices and habitat and behavioral modification to prevent or reduce damage. The reduction of wildlife damage may also require removal of individual animals or reduction in local animal populations through lethal means.

This environmental assessment (EA) documents the analysis of the potential environmental effects of alternatives for WS involvement in mammal damage management (MDM) in Indiana. This analysis relies on data contained in published documents (Appendix A), including the *Animal Damage Control Program Final Environmental Impact Statement* (USDA 1997 Revised). The final environmental impact statement (USDA 1997 Revised) may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

WS is the federal agency directed by law and authorized to protect American resources from damage associated with wildlife (the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c)). To fulfill this Congressional direction, WS activities are conducted to prevent or reduce wildlife damage to agricultural, industrial and natural resources; property; livestock; and threats to public health and safety on private and public lands in cooperation with federal, state and local agencies, private organizations, and individuals. Wildlife damage management is not based on punishing offending animals, but as one means of reducing damage, and is used as part of the WS Decision Model (Slate et al. 1992). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated. The need for action is derived from the specific threats to resources or the public.

² The WS Policy Manual (<http://www.aphis.usda.gov/ws/wsdirectives.html>) provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

WS is a cooperatively funded, service-oriented program that receives requests for assistance with wildlife damage management from private and public entities, including other governmental agencies. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently according to applicable federal, state and local laws and Memorandums of Understanding (MOUs) between WS and other agencies. WS' mission, developed through its strategic planning process, is to provide Federal leadership in managing problems caused by wildlife. WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can damage agricultural and industrial resources, pose risks to human health and safety, and affect other natural resources. The WS program carries out the Federal responsibility for helping to solve problems that occur when human activity and wildlife are in conflict with one another.

WS's Policy Manual reflects this mission and provides guidance for engaging in wildlife damage management through:

- Training of wildlife damage management professionals;
- Development and improvement of strategies to reduce losses and threats to humans from wildlife;
- Collection, evaluation, and dissemination of management information;
- Informing and educating the public on how to reduce wildlife damage;
- Providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989).

Normally, according to the APHIS procedures implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions may be categorically excluded {7 CFR 372.5(c), 60 Fed. Reg. 6,000 -6,003, (1995)}. WS has decided in this case to prepare this EA to facilitate planning, interagency coordination, and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts from the proposed and planned damage management program. Analysis in this EA replaces the analysis of alternatives for the management of mammal damage at airports in the Finding of No Significant Impact and Final Environmental Assessment, "Wildlife Damage Management at Airports in Indiana" (USDA 2002). All wildlife damage management that would take place in Indiana would be undertaken according to relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA).

1.1 PURPOSE OF THIS EA

The purpose of this EA is to address and evaluate the potential impacts on the human environment from alternatives for WS involvement in the protection of agricultural resources, natural resources, property, livestock, and public health and safety from damage and risks associated with mammals in Indiana. Damage problems can occur throughout the State. Under the Proposed Action, mammal damage management (MDM) could be conducted on private, federal, state, tribal, county, and municipal lands in Indiana upon request.

Several mammal species have potential to be the subject of WS MDM activities in Indiana. Mammal species addressed in this EA include but are not limited to: white-tailed deer (*Odocoileus virginianus*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), opossums (*Didelphis virginianus*), red fox (*Vulpes fulva*), gray fox (*Urocyon cinereoargenteus*), feral cats (*Felix sp.*), striped skunk (*Mephitis mephitis*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), woodchuck (*Marmota monax*), feral swine (*Sus scrofa*), domestic/feral dog (*Canis familiaris*), brown (Norway) rat (*Rattus norvegicus*), black (roof) rat (*Rattus rattus*), house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), white-footed mouse (*Peromyscus leucopus*), and meadow vole (*Microtus pennsylvanicus*).

1.2 NEED FOR ACTION

Conflicts between humans and wildlife are common in Indiana. The need for action in Indiana is based on the requests for assistance with the protection of agriculture, property, livestock, natural resources, and human health and safety from mammal damage. Comprehensive surveys of mammal damage in Indiana have not been conducted. The data and information reported below are based on requests for assistance from the public to WS IN, and as such, represent only a portion of the total damage caused by mammals because not all people who experience damage request assistance from WS (Section 1.3). In Indiana, the IDNR has management responsibility for resident mammals, and conducts mammal management programs for furbearers, game species, and non-game mammals. WS' potential involvement in MDM in Indiana would be to provide basic recommendations and referral of callers to the IDNR, and to provide direct management assistance with the implementation of MDM programs upon request and as permitted or otherwise authorized by the IDNR. To date, direct management programs regarding mammals conducted by WS in Indiana have included beaver damage management on private property for flood control, and mammal hazard management at Indiana airports. Additionally, WS cooperates with State and Federal agencies to assess wildlife disease issues involving mammals.

1.2.1 Need for Mammal Damage Management to Protect Human Health and Safety

In Indiana human health and safety concerns and problems associated with mammals include, but are not limited to the potential for transmission of zoonotic diseases to humans, mammal hazards at airports, and other problems.

Zoonotic Diseases. Zoonotic diseases are diseases of animals which are communicable to humans. Some of the mammals in Indiana may carry disease organisms or parasites including viral, bacterial, mycotic (fungal), protozoan and rickettsial diseases which pose a risk to humans.

Individuals or property owners that request assistance with mammals frequently are concerned about potential disease risks but are unaware of the types of diseases that can be associated with mammals. Usually, MDM is requested because of a perceived risk to human health or safety associated with wild animals living near humans, from animals acting out of character in human-inhabited areas during the day, or showing no fear when humans are present. In the majority of cases in which human health concerns are a major reason for requesting MDM, there may have been no actual cases of transmission of disease to humans by mammals to prompt the request. Thus, it is the risk of disease transmission that is the primary reason for requesting and conducting MDM. In most cases, the risk to humans from the diseases discussed below is low and there may not have been a confirmed case of the disease in the state. However, it is the goal of agricultural and human health programs to prevent disease/illness from occurring. Wildlife Services works with cooperators on a case-by-case basis to assess the nature and magnitude of the wildlife conflict including providing information on the limitations about what we know regarding health risks associated with wild mammals. It is the choice of the individual cooperator to tolerate the potential health risks or to seek to reduce those risks.

WS' primary involvement in the management of these types of diseases would be to aid other Federal, State, and local government and research entities in monitoring for the presence or absence of diseases in wildlife. This data can be used to predict potential risks to human health and safety and aid agencies in directing management efforts. In the unlikely event of a disease outbreak, WS could also be asked to conduct localized population reduction to prevent spread of disease to other areas.

Situations in Indiana where the threat of disease associated with wild or feral mammal populations might occur include, but are not limited to:

- Accumulated droppings from denning or foraging raccoons and subsequent exposure to raccoon roundworm in fecal deposits in a suburban community or at an industrial site where humans must work or live in areas of accumulation.
- Exposure of humans to threats of rabies posed by wildlife denning and foraging in a residential community.³
- Threats of parasitic infections to humans from *Giardia* spp. resulting from high beaver populations in a park or recreation area where swimming is allowed.

Beaver damming activity creates conditions favorable to mosquitoes and can hinder mosquito control efforts or result in population increases of these insects (Wade and Ramsey 1986). While the presence of these insects is largely a nuisance, mosquitoes can transmit diseases, such as Eastern equine encephalitis (Mallis 1982) and West Nile Virus (CDC 2000). In addition, beaver are carriers of the intestinal parasite *Giardia lamblia*, which can contaminate human water supplies and cause outbreaks of the disease Giardiasis in humans (Woodward 1983, Beach and McCulloch 1985, Wade and Ramsey 1986, Miller and Yarrow 1994). The CDC has recorded at least 41 outbreaks of waterborne Giardiasis, affecting more than 15,000 people. Beaver are also known carriers of tularemia, a bacterial disease that is transmittable to humans through bites by arthropod vectors or infected animals or by handling animals or carcasses which are infected (Wade and Ramsey 1986). Skinner et al. (1984) found that in cattle-ranching sections of Wyoming the fecal bacterial count was much higher in beaver ponds than in other ponds, something that can be a concern to ranchers and recreationists. On rare occasions, beaver may contract the rabies virus and attack humans. In February 1999, a beaver attacked and wounded a dog and chased some children that were playing near a stream in Vienna, Virginia. Approximately a week later, a beaver was found dead at the site and tested positive for rabies (T. Meinke, WS, pers. comm., 2003).

Stray cats (*Felis catus*) serve as major reservoirs for the bacterium *Bartonella* spp. Stray cats and their fleas (*Ctenocephalides felis*) are the only known vectors for infecting house bound cats and humans with this bacterium. Humans are not infected via the flea, but pet cats often are infected by flea bites. Human infections that may result from exposure of this bacterium via stray cats include: cat scratch disease in immunocompromized patients, bacillary angiomatosis, hepatic peliosis in immunocompromized patients, endocarditis, bacteremia, osteolytic lesions, pulmonary nodules, neuroretinitis, and neurologic diseases (Heller et al. 1997). In areas where dog rabies has been eliminated, but rabies in wildlife has not, cats often are the most significant domestic animal contracting rabies and presenting a subsequent risk of transmission to humans (Eng and Fishbein 1990; Krebs et al. 1996; Vaughn 1976).

Norway rats (*Rattus norvegicus*) and roof rats (*Rattus rattus*) present disease threats to humans. They live in close association to human habitations and provide a potential source of disease transmission. Many of these diseases are transmitted to humans and animals through primary hosts such as fleas, lice, and mites which live on rats (Schmidt and Roberts 1989). Among the diseases rats may transmit to humans or livestock are murine typhus, leptospirosis, trichinosis, salmonellosis (food poisoning), and ratbite fever (Timm 1994). Plague is a disease that can be carried by a variety of rodents, but it is more commonly associated with roof rats than with Norway rats (Timm 1994). Some diseases associated with rats are listed in Table 1-1. The Norway rat and house mouse are the domestic rodents of greatest public health concern in IN. Roof rats are not established in IN, and plague and murine typhus are not currently endemic in IN.

Hantavirus Pulmonary Syndrome is caused by infection with hantaviruses. Hantavirus pulmonary syndrome was first recognized in North America when a cluster of cases was diagnosed in the southwestern US. Infection in humans causes acute, severe respiratory disease with a mortality rate of 38%. Rodents are the primary reservoir hosts of hantaviruses and are asymptomatic carriers, with the white-footed mouse being the primary reservoir host in IN. Human infection occurs when virus particles aerosolized from rodent urine, feces, or saliva are inhaled or by handling rodents (Davidson and Nettles 1997). As of July 6,

³ Impacts of Indiana WS rabies research and management activities are addressed in USDA 2004 and, except as they relate to cumulative impacts on the environment, are not addressed in this EA.

2005, the CDC reports 2 cases of confirmed hantavirus known to be contracted in Indiana. Hantavirus has also been confirmed for two cases contracted in Illinois (CDC 2005a)

Table 1-1. Wildlife Diseases That Pose Potential Human Health Risks in the United States (modified from Davidson and Nettles 1997).

Disease	Causative Agent	Hosts
Anthrax	bacterium (<i>Bacillus anthracis</i>)	cattle, sheep, horses, swine, white-tailed deer, dogs, cats
Dermatophilosis	bacterium (<i>Dermatophilus congolensis</i>)	mammals (wild and domestic)
Demodectic mange	mange mite (<i>Demodex odocoilei</i>)	White-tailed deer
Sarcoptic mange	mite (<i>Sarcoptes scabiei</i>)	red foxes, coyotes, domestic dogs
Swine brucellosis	bacterium (<i>Brucella suis</i>)	swine
Trichinosis	nematode (<i>Trichinella spiralis</i>)	swine, bears, raccoons, foxes, rats
Rabies	virus (Rhabdovirus)	all mammals (high risk wildlife: raccoons, foxes, skunks, bats)
Visceral larval migrans	nematode (<i>Baylisascaris procyonis</i>)	raccoons, skunks
Leptospirosis	bacteria (<i>Leptospira interrogans</i>) over 180 different serovars	All mammals
Echinococcus infection	tapeworm (<i>Echinococcus multilocularis</i>)	foxes, coyotes
Bovine brucellosis	bacterium (<i>Brucella abortus</i>)	cattle (evidence from Texas that organism has infected coyotes that scavenged aborted fetuses and placentas of infected cattle)
Toxoplasmosis	protozoan parasite (<i>Toxoplasma gondii</i>)	Cats, such as bobcats, are definitive hosts, mammals and birds are intermediate hosts
Spirometra infection	tapeworm, (<i>Spirometra mansonioides</i>)	bobcats, raccoons, foxes, dogs, cats
Murine typhus	bacteria (<i>Rickettsia mooseri</i> = <i>R. typhi</i>)	rats, mice, as hosts for primary flea, louse or mite host
Giardiasis	protozoan parasite (<i>Giardia lamblia</i> , <i>G. Duodenalis</i> , and other <i>Giardia</i> sp.-taxonomy controversial)	beavers, coyotes, dogs, cats
Hantavirus Pulmonary Syndrome	Hantaviruses	Rodents
Histoplasmosis	<i>Histoplasma capsulatum</i>	Fungus occurs in bat guano and bird droppings
Lyme Disease	<i>Borrelia burgdorferi</i> (spirochete)	Rodents
Plague	<i>Yersinia pestis</i>	Rodents
Tuberculosis	<i>Mycobacterium bovis</i>	Cervids

Tularemia, also known as “rabbit fever” is a disease caused by a bacterium. Tularemia typically infects animals such as rodents, rabbits, and hares. Typically, people become infected through the bite of infected ticks or tabanid flies, by handling infected sick or dead animals, by eating or drinking contaminated food or water, or by inhaling airborne bacteria. About 200 human cases of tularemia are reported each year in the U.S. Most cases occur in the south-central and western states; however cases have been reported in every state except Hawaii. Cases have also resulted from laboratory accidents. Without treatment with appropriate antibiotics, tularemia can be fatal (CDC 2003a). The causative agent of tularemia is one of the most infectious pathogenic bacteria known, requiring as few as 10 organisms to cause disease. The Working Group on Civilian Biodefense considers tularemia to be a dangerous potential biological weapon because of its extreme infectivity, ease of dissemination, and substantial capacity to cause illness and death (Dennis et al. 2001).

Anthrax is a disease of mammals and is caused by a spore-forming bacterium. Anthrax has an almost worldwide distribution and in the U.S. it occurs sporadically. The Del Rio, Texas, region reported ongoing outbreaks of anthrax in wild deer and livestock in 2001. Other recent U.S. outbreaks include an outbreak in cattle and horses in Minnesota in 2000; in cattle, horses, and bison in North Dakota in 2000; and in cattle in Nebraska in 2001. Only 18 human cases of anthrax were reported in the U.S. between 1900 and 1978, with the majority occurring in special-risk groups, including goat hair mill or goat skin workers and wool or tannery workers. Two of the cases were laboratory related. A 1993 report by the U.S. Congressional Office of Technology Assessment estimated that between 130,000 and 3 million deaths could follow the aerosolized release of 100kg of anthrax spores upwind of the Washington, DC area, lethally matching or exceeding that of a hydrogen bomb (Inglesby et al. 1999). In October 2001, inhalation anthrax was diagnosed in a Florida man who had no known exposure risk factors. The following week, cases of cutaneous anthrax in persons exposed to letters containing a suspicious powder were reported in New York City. The initial investigation showed that four envelopes containing anthrax spores were mailed through the U.S. Postal Service to media outlets in NYC and senate offices in Washington, DC, in September and October 2001. These four recovered envelopes were postmarked at the USPS Trenton Processing and Distribution Center in New Jersey. On 18 October, cutaneous anthrax was confirmed in a New Jersey postal worker (Greene et al. 2002).

Tuberculosis (TB) in humans is a disease caused by bacteria called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. If not treated properly, TB disease can be fatal. TB disease was once the leading cause of death in the United States. TB is spread through the air from one person to another. The bacteria are put into the air when a person with active TB disease of the lungs or throat coughs or sneezes. People nearby may breathe in these bacteria and become infected. In rare instances, TB can also be caused by a species of the *M. tuberculosis* complex called *Mycobacterium bovis* which primarily infects cattle. Humans most commonly become infected with this strain of TB through consumption of unpasteurized milk products from infected cows. For example, from 2001-2005, 35 *M. bovis* cases were identified in New York City. Preliminary investigations indicate that the cases were contracted from the consumption of unpasteurized milk products from Mexico (CDC 2005b). Human TB caused by *M. bovis* in the U.S. is rare because of milk pasteurization and culling of infected cattle herds. In 1917, the federal government established a bovine TB eradication program. Most states in the U.S. have been declared free of the disease (CDC 2005b, c). however, TB has been found in wild white-tailed deer and in dairy herds in the Northern Lower Peninsula of Michigan (see section on Impacts on Agriculture below) and the state lost its TB free status in 2000 (Michigan TB Eradication Project 2004a). In January 2005, the first-known case of transmission of TB from deer to humans was reported in Michigan. The hunter was infected when he cut his hand while gutting an infected deer. The hunter was treated with special antibiotics and was expected to make a full recovery.

Rabies. Rabies is an acute, fatal viral disease of mammals most often transmitted through the bite of a rabid animal. Rabies is preventable, but it is fatal without prior vaccination or post-exposure treatment. In

Indiana, as of 2002, a total of 97 animals have tested positive for rabies since the onset of the epizootic in 1989 (from ISDH Epidemiology Resource Center website: www.state.in.us/isdh/dataandstats). Of these, 95 were bats, and 2 were skunks. In 2002, 31 animals were confirmed with rabies and of those 30 were bats. WS involvement in rabies management in Indiana has consisted of partnering with other State agencies (i.e. IDNR, ISDH, Indiana State Board of Animal Health (ISBAH), Purdue School of Veterinary Medicine-Animal Disease and Diagnostic Lab, and Purdue Cooperative Extension Service) in preparing a response plan for potential spread of the existing epizootic outbreak of rabies in the eastern U.S. to Indiana. Indiana WS' involvement in rabies research and management is addressed in the WS nationwide EA on rabies management (USDA 2004).

Mammal Hazards to Public Safety at Airports. At many airports there is the risk of a mammal/aircraft strike which could result in human injury or death (Cleary and Dolbeer 1999). Although a greater number of wildlife strikes with aircraft involve birds, the most hazardous wildlife species in terms of damage to aircraft, cost of collisions, and effects on flight, is white-tailed deer (Dolbeer et al. 2003). Other mammals which may pose hazards to aircraft and public safety include but are not limited to coyotes, raccoons, opossums, beaver, muskrats, feral dogs, fox, striped skunks and woodchucks. WS receives requests for assistance regarding MDM at civil airports and military airfields in Indiana. WS has been assisting airports in Indiana with the management of wildlife problems including the removal of mammals from the airfields, under buildings, and from common areas where people work or congregate (USDA 2002). Examples include the removal of skunks from hangers and around buildings; deer that have wandered onto the airfield; and coyotes that have crossed runways and taxiways while foraging for rodents.

Other Mammal Hazards to Public Health and Safety. Beaver activity in certain situations can become a threat to public health and safety (e.g., burrowing into or flooding of roadways and railroad beds can result in serious accidents) (Miller 1983, Woodward 1983). Increased water levels in urban areas resulting from beaver activity can lead to unsanitary conditions and potential health problems by flooding septic systems and sewage treatment facilities (DeAlmeida 1987, Loeb 1994). WS may also be requested to provide assistance with reduction of risk of bites and injuries from animals that appear to have lost their fear of humans and/or are behaving aggressively toward people.

1.2.2 Need for Mammal Damage Management to Protect Agricultural Resources

Livestock and dairy production in Indiana contribute substantially to the State's economy. In 2003, Indiana feedlot operators maintained 860,000 cattle and calves valued at an estimated \$224 million (NASS 2004). Milk production in Indiana totaled 2.4 billion pounds in 2003, valued at an estimated \$376.7 million. There were an estimated 143,000 milk cows, 227,000 beef cows, 6,200,000 pigs, 50,000 sheep, and 28.9 million chickens in Indiana during 2003.

The IDNR receives requests for assistance from Indiana citizens experiencing agricultural damage problems from mammals, including, but not limited to the following damage scenarios: 1) predation on livestock, including poultry, from coyotes and foxes; 2) threat and occurrence of damage to crops and stored feed due to mammals such as deer, woodchucks and other rodents; and 3) risk of disease transmission, and 4) other problems. WS would conduct and assist in management efforts involving dogs, cats, deer, and other mammals, coordinated by or with the IDNR; Indiana State Department of Health; USDA, APHIS, Veterinary Services (VS) and/or other Federal and State agencies, to study, monitor and/or control the occurrence and spread of animal diseases and to protect livestock and other agricultural resources throughout the state.

Risk of Disease Transmission

Several of diseases including Chronic Wasting Disease (CWD), pseudorabies, tuberculosis (TB), and, potentially, foot-and-mouth disease, affect domestic animals and wildlife. Monitoring for and containment or eradication of these diseases to protect Indiana agricultural and natural resource interests could include wildlife damage management activities conducted by WS in cooperation with the VS program, IDNR, the

ISBAH or other governmental agencies. As with WS' activities to protect human health and safety, WS could play an important role in the surveillance for diseases transmissible between livestock and wildlife. Samples provided by WS can serve to establish important baseline data on the presence or absence of diseases in the state and can help identify areas where cooperators can focus disease management efforts.

Chronic Wasting Disease (CWD) is a disease of the nervous system of deer and elk. The disease is similar to a group of diseases referred to as transmissible spongiform encephalopathies. This group of diseases includes scrapie of sheep, bovine spongiform encephalopathy (Mad Cow Disease) and Creutzfeldt-Jakob Disease of humans. The agents that cause these infections are called prions, an abnormal form of a naturally occurring nervous system protein. The disease was first recognized in 1967 at a Colorado wildlife research facility. It has now been diagnosed in wild deer and elk in Colorado and Wyoming and in wild deer in Nebraska, South Dakota, Wisconsin, West Virginia, New York, New Mexico, and Saskatchewan. It has also been found on deer and elk farms in a number of states. Cervid (deer, elk, etc.) farming is legal in Indiana. To date, CWD has not been found in any captive or wild cervids in IN. Additional information on CWD is provided in the Section 1.2.4.

WS would conduct and assist in management efforts involving infected and potentially infected animals, coordinated by or with the IDNR, ISBAH and/or other Federal and State agencies, to control the occurrence and spread of CWD throughout the state of Indiana. If warranted, these efforts could include helping the appropriate regulatory agency(ies) depopulate herds of captive cervids.

Foot and Mouth Disease (FMD) is a severe, highly contagious vesicular viral disease of cloven-hoofed animals, including, but not limited to, cattle, swine, sheep, goats, and deer. The disease is rarely fatal in adult animals, although mortality in young animals may be high. FMD is endemic in Africa, Asia, South America, and parts of Europe but the United States has been free of FMD since 1929. Although it is often not fatal, FMD causes severe losses in the production of meat and milk and therefore has grave economic consequences. FMD does not infect humans or horses, however, both could potentially transmit the virus.

While FMD is primarily an economically devastating disease of livestock, experimental studies have clearly demonstrated that it also threatens wildlife. North American wildlife that are susceptible to FMD include white-tailed deer, other deer species, feral pigs, bison, moose, antelope, musk ox, caribou, sheep, and elk. Most free-living North American wildlife have had no previous virus exposure, and there is little information available about their vulnerability (USGS NWHC 2001). Each state in the U.S. is or has developed its own FMD emergency response plan. Appendix C of the State of Indiana Emergency Operations Plan (Emergency Support Function #17) details the response protocol should FMD either be suspected or confirmed in Indiana. In the event of FMD outbreak in Indiana State officials will contact the USDA WS, office to notify of a possible request for assistance from a field location if assessments warrant such a request.

Pseudorabies is a disease of swine that can also affect cattle, horses, dogs, cats, sheep, and goats. The disease is caused by the pseudorabies virus, an extremely contagious herpes virus that causes reproductive problems, including abortion, stillbirths, and even occasional death in breeding and finishing hogs. The United States is one of the world's largest producers of pork and is the second largest exporter of pork. U.S. pork production accounts for about 10 percent of the total world supply. The retail value of pork sold to consumers exceeds \$30 billion annually. In addition, the pork industry supports more than 600,000 jobs. In 2004, domestic swine in all 50 states had attained Stage V pseudorabies free status. However, pseudorabies is still found in feral swine and these animals serve as a potential source of infection for domestic animals.

Tuberculosis (TB) in livestock caused by *Mycobacterium bovis*. *M. bovis* has been reported in a wide variety of mammals including cattle, bison, elk, deer and various zoo animals (Davidson and Nettles 1997). Non ruminants including cats, dogs, coyotes and feral swine can also be infected however the ability of some of these species to subsequently shed and spread the virus is unclear. In 1917, the federal government established a bovine TB eradication program. Most states in the U.S. have been declared free

of the disease (CDC 2005b, c). however, TB has been found in wild white-tailed deer and dairy herds in the Northern Lower Peninsula of Michigan and the state lost its TB free status in 2000 (MDA 2004a). Loss of TB free status can result in the imposition of quarantines and testing procedures has serious economic impacts on the livestock industry in the affected area. In addition to white-tailed deer and cattle, studies in Michigan have identified TB antibodies in elk, coyotes, raccoons, black bears, bobcats, red foxes and Virginia opossums (MDA 2004b). The presence of TB in wildlife populations can complicate and delay efforts to eradicate TB in livestock (Davidson and Nettles 1997).

The domestic cat has been found to transmit the protozoan parasite, *Toxoplasma gondii* to both domestic and wild animal species. Cats have been found to be important reservoirs and the only species known to allow for the completion of the life cycle for *T. gondii* (Dubey 1973; Teutsch et al. 1979). Both stray and domiciled cats may be infected by this protozoan, but this infection is more common in stray cats. Fitzgerald et al. (1984) documented that feral and free-ranging cats transmitted *T. gondii* to sheep in New Zealand, resulting in abortion in ewes. Dubey et al. (1995) found cats to be 68.3% positive for seroprevalence of *Toxoplasma gondii* on swine farms in Illinois and the major reservoir for this disease. The main sources for infecting cats are thought to be birds and mice. Diseases that may be communicable from free-ranging or feral cats to pet cats include feline panleukopenia (FPL) infection, feline calicivirus infection, feline reovirus infection, and feline syncytium-forming virus infection (Gillespie and Scott 1973). Of the four feline diseases, feline panleukopenia is considered to be the most serious. Reif (1976) found that during the acute stages of feline panleukopenia, fleas were vectors of this disease to other cats. FPL infection is cyclic in nature, being more prevalent in the July to September time period.

Feral swine are potential reservoirs for several diseases and parasites that threaten livestock. Of greatest concern is infection of swine production facilities with diseases like swine brucellosis, pseudorabies, and brucellosis. A study (Corn et al, 1986) conducted in Texas found that feral swine do represent a reservoir of diseases transmissible to livestock. Swine harvested in this study tested positive for pseudorabies, brucellosis, and leptospirosis. Other diseases carried by feral swine include hog cholera, tuberculosis, bubonic plague, and anthrax (Beach 1993). A recent study in Oklahoma (Saliki et al. 1998) found samples also positive for antibodies against porcine parvovirus, swine influenza and the recently emerged porcine reproductive and respiratory syndrome virus (PRRS). PRRS is a highly infectious virus, requiring only a few viral particles to initiate infection (Henry 2003). WS could be requested to assist with the collection of blood and tissue samples from feral swine to determine the diseases present in feral swine in Indiana and subsequent risks, if any, to the state livestock industry.

Damage to Crops

Deer damage to agricultural crops represents a serious negative economic impact with farm operators. In 2003, soybeans was the principal crop damaged (36 percent of complaints), followed by corn (30 percent). In a study of wildlife damage to crops in north-central Indiana, wildlife damage was found in 149 of the 160 fields surveyed. Raccoons and white-tailed deer were responsible for >97% of the damage to corn (87% and 10%, respectively), whereas white-tailed deer (61%) and groundhogs (*Marmota monax*; 38%) were responsible for nearly all damage to soybean plants (Humberg et al. 2004). In Indiana, most instances of deer damage to crops are handled by the IDNR which may issue crop depredation permits.

Feral swine are responsible for large scale destruction of crops, hay meadows, and pasture primarily by rooting and wallowing. Rooting is a common activity and is done year-round in search of food (Stevens 1996). The feral hog's rooting and wallowing activities damage pastures and hay meadows, spoil watering holes and can severely damage riparian habitats. Damage to crops results both from direct consumption of crops and feeding related activities (i.e., trampling and rooting).

Voies are reported to damage orchard trees by gnawing. Trees are badly damaged or the bark is girdled and trees die when feeding by rabbits and voles is severe. Similar damage occurs in nurseries which grow landscape ornamentals and shrubs.

Rats (*Rattus spp.*) cause damage to stored grain through feeding and contamination with droppings. They may damage crops in fields and containers and packaging materials in stored food. They cause structural damage to commodity storage structures and foundations, etc. by burrowing and gnawing.

Predation and Livestock

Red foxes, gray foxes, coyotes, and feral dogs can cause predation losses or injury to livestock (e.g. sheep, goats, cattle, pigs, horses) and poultry (e.g. chickens, turkeys, geese ducks). Sheep and lamb losses from predators in the U.S. totaled 224,200 head and \$18.3 million during 2004 (NASS 2005). Coyotes and dogs accounted for 60.5% and 13.3% of these predator losses, respectively. In 2005, cattle and calf losses from predators in the U.S. totaled 190,000 head and \$92.7 million (NASS 2006). Coyotes and dogs accounted for 51.1% and 11.5% of these predator losses, respectively. In 2005, Indiana producers reported losing 300 cows and 1,200 calves to predation. (NASS 2006). Cattle and calves are most vulnerable to predation at calving time and less vulnerable as they get older and larger (Horstman and Gunson 1982).

Feral swine can be efficient predators. Calves, kids, lambs, and poultry have been known to become prey of feral swine (Stevens 1996, Beech 1993).

1.2.3 Need for Mammal Damage Management to Protect Property

In Indiana during FY 2001-2003, WS received reports of mammal damage to property by the following species: white-tailed deer (damage to landscaping), gray squirrel (damage to vegetable gardens, residential buildings, and vehicles), raccoons (damage to residential buildings, and other property), coyotes (predation on pets), beaver (property), skunks (landscaping, property), moles (general property damage), and other mammal species. The IDNR also receives requests from the public in situations where deer, beaver, coyote and other mammals are causing property damage.

Deer browsing damages and destroys landscaping and ornamental trees, shrubs, and flowers. As rural areas are developed, deer habitat may actually be enhanced because fertilized lawns, gardens, and landscape plants serve as high quality sources of food (Swihart et al. 1995). Furthermore, deer are prolific and adaptable, characteristics that allow them to exploit and prosper in most suitable habitat near urban areas, including residential areas (Jones and Witham 1990). The succulent nature of many ornamental landscape plants, coupled with high nutrient contents from fertilizers, offers an attractive food source for deer. In addition to browsing pressure, male white-tailed deer damage ornamental trees and shrubs by antler rubbing which results in broken limbs and bark removal. While large trees may survive antler-rubbing damage, smaller saplings often die or become scarred to the point that they are not aesthetically acceptable for landscaping.

Most of the damage caused by beaver is a result of dam building, bank burrowing, tree cutting, obstructing overflow structures and spillways, or flooding. Some cases of beaver damage include roads being flooded, reservoir dams being destroyed by bank den burrows, and train derailments being caused by continued flooding and burrowing (Miller and Yarrow 1994). Housing developments have been threatened by beaver dam flooding. Some small bridges also have been destroyed because of beaver dam-building activity. Miller (1983) estimated that the annual damage by beavers in the United States was \$75-\$100 million. The estimated value of beaver damage is perhaps greater than that of any other single wildlife species in the U.S. with economic damage estimated to have exceeded \$4 billion in the southeastern U.S. over a 40-year period (Arner and Dubose 1980). In some southeastern states, losses from beaver damage have been estimated at \$3 million to \$5 million dollars annually (Miller and Yarrow 1994), with timber losses as the most common type of damage (Hill 1982). Tracts of bottomland hardwood timber up to several thousand acres in size may be lost to beaver activity (Miller and Yarrow 1994). Beaver often inhabit sites in or adjacent to urban/suburban areas and cut or girdle trees and shrubs in yards, undermine yards and walkways by burrowing, flood homes and other structures, destroy pond and reservoir dams by burrowing into levees, gnaw on boat houses and docks, and cause other damage to private and public property (Wade

and Ramsey 1986). Additionally, roads and railroads may be damaged by saturation of the roadbed from beaver flooding or by beaver burrowing into the banks that comprise roadbeds and railroad beds.

In addition to the risks to human health and safety discussed in Section 1.2.1, mammals can also cause considerable damage to property at airports. Deer, coyotes, skunks and raccoons venture onto airfields and become a direct threat to planes both landing and taking off. Over the period of 1985-1998 the USAF recorded more than 190 strikes that involved aircraft and mammals resulting in more than \$496,000 in damage (Cleary and Dolbeer 1999). Deer strikes are the most costly to aircraft. At Laughlin Air Force Base in March of 2000, a T-38 Talon hit a deer on landing and caused damage to the left main landing gear (BASH 2000). Also at Little Rock Air Force Base, between 1993 and 1998 three deer strikes were recorded (BASH 2000), averaging over \$4,600 in damage per strike. An Indiana airport also experienced a similar mammal strike in January 2000. A Falcon 900 B struck a coyote during take off. Damage was done to the landing gear of the aircraft, which put the plane out of service for more than 24 hours and cost \$29,600 in damage (Personal communication, Keith Berlen, 10/12/00, Bird Strike Report). WS has been working at Indiana airports to reduce threats through technical assistance and direct control (USDA 2002).

1.2.4 Need for Mammal Damage Management to Protect Natural Resources

Natural resources may be described as those assets belonging to the public and often managed and held in trust by government agencies for citizens. Such resources may be plants or animals, including threatened and endangered species, historic properties, or habitats in general. Examples of natural resources in Indiana are historic structures and places; parks and recreation areas; natural areas, including unique habitats or topographic features; threatened and endangered plants or animals; and any plant or animal populations which have been identified by the public as a natural resource.

Examples of mammal damage to natural resources is vegetation at a park which is being damaged by excessive browsing by overabundant white-tailed deer populations, or ground-nesting game bird populations which are being decimated by the presence of mammal predators such as raccoons, coyotes, or foxes. Other instances where mammals may damage or negatively affect natural resources include, but are not limited to, over browsing by deer in forest habitats, damage to wetland and stream banks by muskrat and burrowing mammals, and beaver damage to timber, seedlings, and other vegetation in natural areas, parks, and private properties. Patterson (1951) and Avery (1992) reported the presence of beaver dams can negatively affect fisheries. Beaver dams may adversely affect stream ecosystems by increasing sedimentation in streams, and thereby negatively affect wildlife that depend on clear water.

Deer overabundance can affect native vegetation and natural ecosystems. White-tailed deer selectively forage on vegetation (Strole and Anderson 1992), and thus can have substantial impacts on certain herbaceous and woody species and on overall plant community structure (Waller and Alverson 1997). These changes can lead to adverse impacts on other wildlife species, which depend on these plants for food and/or shelter. Numerous studies have shown that over browsing by deer can decrease tree reproduction, understory vegetation cover, plant density, and plant diversity (Warren 1991). For example, in the Great Smokey Mountains National Park in Tennessee, an area heavily populated by deer had a reduction in the number of plant species, a loss of hardwood species and a predominance of conifer species compared to an ecologically similar control area with fewer deer (Bratton 1979). This alteration and degradation of habitat from over-browsing by deer can have a detrimental effect on deer herd health and may displace other wildlife communities (e.g., neotropical migrant songbirds and small mammals) that depend upon the understory vegetative habitat destroyed by deer browsing (VDGIF 1999). Similarly, De Calesta (1997) reported that deer browsing affected vegetation that songbirds need for foraging surfaces, escape cover, and nesting. Species richness and abundance of intermediate canopy nesting songbirds was reduced in areas with higher deer densities (De Calesta 1997). Intermediate canopy-nesting birds declined 37% in abundance and 27% in species diversity at higher deer densities. Five species of birds were found to disappear at densities of 38.1 deer per square mile and another two disappeared at 63.7 deer per square mile. Casey and Hein (1983) found that 3 species of birds were lost in a research preserve stocked with high densities of ungulates and that the densities of several other species of birds were lower than in an

adjacent area with lower deer density. Waller and Alverson (1997) hypothesize that by competing with squirrels and other fruit-eating animals for oak mast, deer may further affect many other species of animals and insects.

Feral swine can compete with and prey upon native wildlife and severely damage wildlife habitats. Feral swine are omnivorous and feed on a wide variety of items, many of which are staples for native fauna. One of the more important seasonal food resources used by feral swine is wild fruit and nut crops, especially oak mast (Wood and Roark 1980). Oak mast is also an important food source for deer and wild turkey. When feral swine actively compete for mast, resident deer and wild turkey may enter the winter with inadequate fat reserves, thus threatening the viability of these native wildlife species (Beach 1993). Feral swine also predate native wildlife, especially young animals and ground nesting birds, their nestlings and eggs (Beach 1993). The rooting and foraging behavior of feral swine can completely destroy the understory in forests and make trees less stable during windstorms. Their wallowing and foraging can significantly damage wetlands, which may be important for threatened and endangered (T&E), and sensitive species such as fish.

Need to Protect T&E Species

Some of the species listed as threatened or endangered under the Endangered Species Act of 1973 and Indiana Endangered Species Conservation Act are preyed upon or otherwise adversely affected by certain mammal species. Piping plovers (*Charadrius melodus*, Federally threatened, State endangered), Interior least terns (*Sterna antillarum*, State endangered), and black-crowned night herons (*Nycticorax nycticora*, State endangered) can be negatively affected by raccoons, opossums, striped skunks, and other mammals that prey on birds, eat eggs, and cause disturbances on nesting sites. A WS predation management program to protect rare species can be one component of integrated programs that also include nest exclosures, management of public access and impacts, and other methods.

Predator damage management can be an important tool for achieving and maintaining game, nongame, and T&E species production and management objectives. Massey (1971) and Massey and Atwood (1979) found that predators can prevent least terns from nesting or cause them to abandon previously occupied sites. In another study, mammal predators were found to have significantly impacted the nesting success of least terns on sandbars and sandpits (Kirsch 1996). Skunks (Massey and Atwood 1979), red foxes (Minsky 1980), coyotes (Grover and Knopf 1982), and raccoons (Gore and Kinnison 1991) are common predators of least terns. During one 2-year study, coyotes destroyed 25.0-38.5% of all interior least tern nests (Grover 1979). Raccoons are considered a major predator of ground-nesting upland bird nests and poults (Speake 1980, Speake et al. 1985, Speake et al. 1969). In Massachusetts, predators destroyed 52-81% of all active piping plover nests from 1985-1987 (MacIvor et al. 1990). Red foxes accounted for 71-100% of the nests destroyed by predators at the site. Balser et al. (1968) recommended that predator damage management programs target the entire predator complex or compensatory predation may occur by a species not under control, a phenomena also observed by Greenwood (1986). Trautman et al. (1974) concluded that a single species predator damage management program showed some promise for enhancing ring-necked pheasant (*Phasianus colchicus*) populations.

Need to Protect Natural Resources, Including Wildlife, from Disease. Chronic wasting disease of mule deer, Rocky Mountain elk and white-tailed deer is a disease most commonly believed caused by infectious protein particles, otherwise known as prions. Chronic Wasting Disease is a member of the group of diseases known as transmissible spongiform encephalopathies. Scrapie, "Mad Cow Disease", transmissible mink encephalopathy, and the human variant Creutzfeldt-Jakob disease are other known transmissible spongiform encephalopathies. In infected animals, the brain takes on a sponge-like appearance and symptoms may include head tremors, walking repetitive courses, wide-based stance, gradual loss of body condition, and excessive drinking, urination, and salivation. Death is inevitable once clinical disease occurs (Doster 2002).

Chronic Wasting Disease in wild free-ranging deer and elk is known to exist in West Virginia, New York, Colorado, Wyoming, Nebraska, South Dakota, Wisconsin, New Mexico, and Illinois. Chronic Wasting Disease in game farm elk and deer has been found in, Colorado, Wisconsin, Montana, South Dakota, Oklahoma, Kansas, Nebraska, Minnesota, Alberta, and Saskatchewan. Although CWD has not been found in Indiana, state and federal agencies are continuing surveillance as captive deer herds still pose a risk factor. There currently is no convincing evidence that CWD affects humans. Public health officials due however recommend that human exposure to CWD be avoided as they continue to evaluate any potential risk.

If CWD were to occur in Indiana management of the disease would likely be focused on natural resource protection by controlling/eliminating the spread of the disease to the native white-tailed deer herd. This work would be coordinated by the IDNR, and may include monitoring, biological sampling and research, capture, euthanasia, and/or lethal control of white-tailed deer, as well as other activities. WS involvement in a chronic wasting disease management program in Indiana would be as requested by IDNR, and would include use of lethal and non-lethal deer and other wildlife management methods to accomplish disease management and natural resource protection objectives.

1.3 **WS RECORD KEEPING REGARDING REQUESTS FOR MAMMAL DAMAGE MANAGEMENT ASSISTANCE**

WS maintains a Management Information System (MIS) database to document assistance that the agency provides in addressing wildlife damage conflicts. MIS data is limited to information that is collected from people who have requested services or information from WS. It does not include requests received or responded to by local, State or other Federal agencies, and it is not a complete database for all wildlife damage occurrences. In IN, the IDNR has the responsibility to manage resident mammals, and conducts mammal management programs for species such as furbearers, game species, and nongame mammals. The number of requests for assistance to WS does not necessarily reflect the extent of need for action, but this data does provide an indication that needs exists.

The WS database includes, but is not limited to, the following information: species of wildlife involved, the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection. Table 1-2 provides a summary of Technical Assistance projects completed by the Indiana WS program for Fiscal Years 1998-2003. A description of the WS Direct Control and Technical Assistance programs is contained in Chapter 3 of this EA. Data presented in this table were taken from Indiana WS Annual Program Reports and represent the number of technical assistance projects conducted by the Indiana WS program and do not include data from operational projects conducted during the time period covered.

Table 1-2*. Annual number of incidents for technical assistance involving mammals for Indiana Wildlife Services during 1998-2003.

Fiscal Year	Agriculture	Human Health and Safety	Property	Natural Resources	Total
1998	46	124	323	2	495
1999	37	573	1438	47	2095
2000	51	456	1490	5	2002
2001	37	651	1533	0	2221
2002	54	652	1217	1	2024
2003	52	1092	1639	4	2787
Total	277	3548	7640	59	11,624

1.4 PROPOSED ACTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) proposes to continue the current damage management program that responds to mammal damage in the State of Indiana. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce mammal damage to property, agricultural resources, and natural resources, to reduce adverse mammal impacts on human and livestock health and safety, and to obtain samples for surveillance of wildlife diseases. Damage management would be conducted on public and private property in Indiana when the resource owner (property owner) or manager requests assistance or, in the case of animal disease management and surveillance, when assistance is requested by an appropriate state, federal or local government agency. The IWDM strategy would encompass the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, non-lethal methods like physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, mammals would be removed as humanely as possible using shooting, trapping, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy. WS involvement in MDM in Indiana is closely coordinated with the Indiana Department of Natural Resources (IDNR). All WS actions are conducted in compliance with applicable Federal, State, Tribal, and Local laws, regulations, policies, orders and procedures.

1.5 DECISION TO BE MADE

Based on the scope of this EA, the decisions to be made are:

- Should WS implement an integrated MDM strategy, including technical assistance and direct control, to meet the need for MDM in Indiana?
- If not, should WS attempt to implement one of the alternatives to an integrated MDM strategy as described in the EA?
- Would the proposed action have significant impacts on the quality of the human environment, requiring preparation of an Environmental Impact Statement (EIS)?

1.6 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.6.1 Actions Analyzed

This EA evaluates MDM by WS to protect: 1) property; 2) agricultural resources; 3) natural resources; and 4) public health and safety in Indiana. Protection of other resources or other program activities would be addressed in other NEPA analysis, as appropriate.

1.6.2 American Indian Lands and Tribes

Currently, Indiana WS does not have any MOUs with any American Indian tribes. If WS enters into an agreement with a tribe for MDM, this EA would be reviewed and supplemented, if appropriate, to insure

compliance with NEPA. MOUs, agreements and NEPA documentation would be prepared as appropriate before conducting MDM on tribal lands.

1.6.3 Period for which this EA is Valid

If it is determined that an EIS is not needed, this EA would remain valid until the WS program in Indiana and other appropriate agencies determine that new needs for action, changed conditions or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document would be supplemented pursuant to NEPA. Review of the EA would be conducted each year to ensure that the EA is sufficient.

1.6.4 Site Specificity

This EA analyzes the potential impacts of MDM and addresses activities on all lands in Indiana under MOUs, Cooperative Agreements and in cooperation with the appropriate public land management agencies. It also addresses the impacts of MDM on areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional MDM efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Planning for the management of mammal damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, etc. Although some of the sites where mammal damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible, however, many issues apply wherever mammal damage and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in Indiana (see Chapter 3 for a description of the Decision Model and its application).

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* within the State of Indiana. In this way, WS believes it meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission.

1.6.5 Summary of Public Involvement

Issues related to the proposed action were initially developed by WS. As part of WS' Environmental Analysis process, and as required by the Council on Environmental Quality (CEQ 1981) and APHIS-NEPA implementing regulations, this document and its Decision will be made available to the public through "Notices of Availability" (NOA) published in local media and through direct mailings of NOA to parties that have specifically requested to be notified. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA should be revisited and, if appropriate, revised prior to issuance of a final Decision.

1.7 RELATIONSHIP TO OTHER ENVIRONMENTAL DOCUMENTS

ADC Programmatic Environmental Impact Statement. WS, previously called Animal Damage Control (ADC), has issued a Final Environmental Impact Statement (FEIS) on the national WS program

(USDA 1997 Revised). Pertinent and current information available in the FEIS has been incorporated by reference into this EA.

Supplemental Environmental Assessment: Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Foxes, and Coyotes in the United States. In 2004, WS supplemented its environmental assessment and Finding of No Significant Impact for its program to aid in the control of specific rabies variants in the U.S. including efforts to prevent the spread of raccoon variant rabies from the Eastern U.S. (USDA 2004). The supplement includes analysis of potential WS rabies research and management actions in Indiana.

Wildlife Services Wildlife Damage Management at Airports Environmental Assessment and Finding of No Significant Impact. In 2002, the WS program issued a Finding of No Significant Impact and a Final Environmental Assessment entitled, "Wildlife Damage Management at Airports in Indiana," which evaluated alternatives and impacts to the environment and selected an Integrated Wildlife Damage Management (IWDM) approach to manage damage associated with wildlife at airports in Indiana (USDA 2002). The analysis of impacts from alternatives for the management of mammal damage at airports will be replaced by the analysis in this EA.

1.8 AUTHORITY AND COMPLIANCE

1.8.1 Wildlife Services Legislative Authority

WS is the Federal program authorized by law to help reduce damage caused by wildlife. The primary statutory authorities for the APHIS-WS program are the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c). The mission of the USDA/APHIS/WS program is to provide federal leadership in managing conflicts with wildlife. Wildlife Services' mission, developed through its strategic planning process (USDA 1989), is: 1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety."* WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can cause damage to agriculture and property, pose risks to human health and safety, and affect industrial and natural resources. WS conducts programs of research, technical assistance and applied management to resolve problems that occur when human activity and wildlife conflict.

Additionally, Memoranda of Understanding among WS and other governmental agencies also define WS responsibilities in wildlife damage management. For example, a Memorandum of Understanding between the Federal Aviation Administration (FAA) and WS recognizes WS role and expertise in providing wildlife hazard management assistance to the aviation community. It states, that the "FAA or the certificated airport may request technical and operational assistance from WS to reduce wildlife hazards."

1.8.2 Indiana Department of Natural Resources Legislative Authority

The Indiana Department of Natural Resources (IDNR), under the direction of the Conservation Commission, is specifically charged by the General Assembly with the management of the state's wildlife resources. The primary statutory authorities include the protection, reproduction, care, management, survival, and regulation of wild animal populations regardless of whether the wild animals are present on public or private property in Indiana (IC 14-22-2-3).

1.8.3 Indiana State Board of Animal Health

The ISBAH is authorized under I.C. 15-2.1 to promote and encourage the prevention, suppression, control and eradication of infectious, contagious and communicable diseases affecting the health of animals within Indiana and the trade in animals and animal products in and from Indiana.

1.8.4 Compliance with Federal Laws

Several federal laws regulate WS' wildlife damage management actions. WS complies with these laws and regulations, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act. All Federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). WS follows the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500 et seq.), USDA NEPA implementing regulations (7 CFR 1b), and the APHIS Implementing Procedures (7 CFR 372) as a part of the decision-making process. NEPA sets forth the requirement that Federal actions with the potential to significantly affect the human environment be evaluated in terms of their impacts for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. Federal activities affecting the physical and biological environment are regulated, in part, by CEQ through regulations in Title 40, Code of Federal Regulations, Parts 1500-1508. In accordance with CEQ and USDA regulations, APHIS NEPA Procedures, as published in the Federal Register (44 CFR 50381-50384) provide guidance to APHIS regarding the NEPA process.

Pursuant to NEPA and CEQ regulations, this EA documents the analysis of a proposed Federal action's impact, informs decision-makers and the public of reasonable alternatives, and serves as a decision-aiding mechanism to ensure that the policies and goals of NEPA are infused into Federal agency planning and decision making. An EA is prepared by integrating as many of the natural and social sciences as may be warranted based on the potential effects of the proposed action. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

Endangered Species Act (ESA). It is federal policy, under the ESA, that all federal agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the Act (Sec. 2(c)). WS conducts Section 7 consultations with the United States Fish and Wildlife Service (USFWS) to use the expertise of the USFWS to ensure that "any action authorized, funded or carried out by such an agency... is not likely to jeopardize the continued existence of any endangered or threatened species . . . each agency shall use the best scientific and commercial data available" (Sec. 7(a)(2)). WS obtained a Biological Opinion (B.O.) from the U.S. Fish and Wildlife Service describing potential effects of the National WS program on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997 Revised, Appendix F). WS has consulted with the Indiana USFWS Field Office on a project by project basis and will consult with the Federal Endangered Species programs prior to the initiation of damage management activities in new areas.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The U.S. Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods integrated into the WS program in Indiana are registered with and regulated by the EPA and the Office of the Indiana State Chemist (OISC) and used by WS in compliance with labeling procedures and other requirements.

Executive Order 13112 of February 3, 1999. This order directs Federal agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm, or harm to human health. To comply with Executive Order 13112, WS may cooperate with other Federal, State, or Local government agencies, or with

industry or private individuals to reduce damage to the environment or threats to human health and safety.

Occupational Safety and Health Act of 1970. The Occupational Safety and Health Act of 1970 and its implementing regulations (29CFR1910) on sanitation standards states that, "Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected." This standard includes mammals that may cause safety and health concerns at workplaces.

The Clean Water Act (33 U.S.C. 1344). The Clean Water Act provides regulatory authority and guidelines for the EPA and the U.S. Army Corps of Engineers related to wetlands. Several Sections of the Clean Water Act pertain to regulating effects on wetlands. Section 101 specifies the objectives of this Act, which are implemented largely through Subchapter III (Standards and Enforcement), Section 301 (Prohibitions). The discharge of dredged or fill material into waters of the United States is subject to permitting specified under Subchapter IV (Permits and Licenses) of this Act. Section 401 (Certification) specifies additional requirements for permit review particularly at the State level. WS consults with appropriate regulatory authorities when wetlands exist in proximity to proposed activities or when such activities might impact wetland areas. Such consultations are designed to determine if any wetlands will be affected by proposed actions.

Food Security Act. The Wetland Conservation provision (Swampbuster) of the 1985 (16 U.S.C. 3801-3862), 1990 (as amended by PL 101-624), and 1996 (as amended by PL 104-127) Food Security Act require all agricultural producers to protect wetlands on the farms they own. Wetlands converted to farmland prior to December 23, 1985 are not subject to wetland compliance provisions even if wetland conditions return as a result of lack of maintenance or management. If prior converted cropland is not planted to an agricultural commodity (crops, native and improved pastures, rangeland, tree farms, and livestock production) for more than 5 consecutive years and wetland characteristics return, the cropland is considered abandoned and then becomes a wetland subject to regulations under Swampbuster and Section 404 of the Clean Water Act. The USDA Natural Resource Conservation Service (NRCS) is responsible for certifying wetland determinations according to this Act.

The Native American Graves and Repatriation Act of 1990. The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

National Historic Preservation Act (NHPA) of 1966 as amended. The NHPA of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that have the potential to cause effects on historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the Advisory Council on Historic Preservation (i.e. State Historic Preservation Office, Tribal Historic Preservation Officers), as appropriate. WS actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties.

Each of the MDM methods described in this EA that might be used operationally by WS do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that

could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

There is potential for audible effects on the use and enjoyment of a historic property when methods such as propane exploders, pyrotechnics, firearms, or other noise-making methods are used at or in close proximity to such sites for purposes of hazing or removing animals. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage or nuisance problem, which means such use would be to benefit the historic property. A built-in mitigating factor for this issue is that virtually all of the methods involved would only have temporary effects on the audible nature of a site and can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary in those types of situations.

Environmental Justice and Executive Order 12898 - "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." Executive Order 12898, promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental Justice is a priority within APHIS and WS. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies and activities on minority and low-income persons or populations. APHIS implements Executive Order 12898 principally through its compliance with NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898.

WS personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. All pesticides used by WS are regulated by the EPA through FIFRA, the Indiana Department of Environmental Protection, by MOUs with land managing agencies, and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997 Revised, Appendix P). The WS operational program properly disposes of any excess solid or hazardous waste. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations. In contrast, the proposed action may benefit minority or low-income populations by reducing mammal damage such as threats to public health and safety.

Protection of Children from Environmental Health and Safety Risks (Executive Order 13045). Children may suffer disproportionately from environmental health and safety risks for many reasons, including their developmental, physical and mental status. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that this proposal might have on children. The proposed MDM program would only occur by using legally available and approved methods where it is highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing this proposed action.

Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360). This law places administration of pharmaceutical drugs, including those used in wildlife capture and handling, under the Food and Drug Administration.

Controlled Substances Act of 1970 (21 U.S.C. 821 et seq.). This law requires an individual or agency to have a special registration number from the federal Drug Enforcement Administration (DEA) to possess controlled substances, including those that are used in wildlife capture and handling.

Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA). The AMDUCA and its implementing regulations (21 CFR Part 530) establish several requirements for the use of animal drugs, including those used to capture and handle wildlife in rabies management programs. Those requirements are: (1) a valid "veterinarian-client-patient" relationship, (2) well defined record keeping, (3) a withdrawal period for animals that have been administered drugs, and (4) identification of animals. A veterinarian, either on staff or on an advisory basis, would be involved in the oversight of the use of animal capture and handling drugs under the proposed action. Veterinary authorities in each state have the discretion under this law to establish withdrawal times (i.e., a period of time after a drug is administered that must lapse before an animal may be used for food) for specific drugs. Animals that might be consumed by a human within the withdrawal period must be identified; the Western Wildlife Health Committee of the Western Association of Fish and Wildlife Agencies has recommended that suitable identification markers include durable ear tags, neck collars, or other external markers that provide unique identification (WWHC *undated*). APHIS-WS establishes procedures in each state for administering drugs used in wildlife capture and handling that must be approved by state veterinary authorities in order to comply with this law.

1.8.5 Indiana Wildlife Laws, Regulations and Policies Regarding Mammal Damage Management

Several state laws and regulations pertain to WS' wildlife damage management actions. WS complies with these laws and regulations, and consults and cooperates with other agencies as appropriate.

Indiana Code (IC) Title 14 contains fish, game, and wildlife law for the State of Indiana.

IC 14-22-6-14. Control of deer population; landowner assistance program. Sec. 14 (a) The: (1.) division of fish and wildlife of the department; and (2.) division of soil conservation of the department, through the soil and water conservation districts established under IC 14-32; shall, in cooperation with other conservation education organizations and one or more organizations of hunters, establish a program to help landowners with problems determined by the director to be caused by localized deer population. (b) The program established under this section must educate landowners concerning the means by which a landowner can: (1.) control; or (2.) obtain assistance in controlling the deer population on the landowner's tract of land. (c) Under the program established under this section, one or more hunters or organizations of hunters may, upon request by a landowner, work with the department and the landowner to alleviate problems caused by localized deer populations. (d) In each county, the division of fish and wildlife, in cooperation with the soil and water conservation district established within the county under IC 14-32, shall disseminate information about the program established under this section.

IC 14-22-25. Importation Permit. This chapter does not apply to the following: (1) Animals imported into Indiana for the purpose of being confined and exhibited in a zoo or other public display of animals. (2) Other animals that the department designates.A person may not bring into Indiana, for the purpose of release or selling for release in Indiana, live fish, the fry of live fish, or any other living wild animal without a permit issued by the department.A permit may be granted only upon satisfactory proof that the specific animals intended to be imported meet the following conditions: (1) The animals are free of a communicable disease at the time of

importation. (2) The animals will not become a nuisance. (3) The animals will not cause damage to a native wild or domestic species.

IC 14-22-28. Permit to Take, Kill, or Capture Wild Animal Damaging Property. The director may issue to a person that owns or has an interest in property being damaged or threatened with damage by a wild animal protected by this article a free permit to take, kill, or capture the wild animal....Notwithstanding any other prohibition or requirement of this article or the rules adopted under this article, the director shall prescribe the following: (1) The manner of taking the wild animal. (2) The expiration of the permit. (3) The rules the director considers necessary. (4) The disposition of the animal.....The director may have an investigation made of a complaint that wild animals are causing damage. If it is found that: (1) the damage has not been caused by wild animals; or (2) the person would abuse the privileges; a permit shall be denied.....A protected wild animal killed, captured, or taken during the closed season shall be disposed of in the manner that the director considers necessary.

IC 14-22-6-4. Trapping; tending traps. A person may not do the following: (1) Tend or visit a trap or remove a furbearing animal from a trap that is not the person's property without the permission of the owner. (2) Fail to tend or visit or have tended or visited a trap and remove a furbearing animal from a trap that is the person's property within a period not exceeding twenty-four (24) hours.

IC 14-22-6-5. Trapping; underwater box traps. A person may trap furbearing animals with an underwater box trap during trapping season.

IC 14-22-6-6. Trapping; snares. A person may not use a snare for the trapping of animals, except upon land owned by the user or with the written permission of the owner. (b) A snare that permits a circumference of more than fifteen (15) inches may not be used for the trapping of animals unless: (1) at least fifty percent (50%) of the loop of the snare is covered by water; or (2) the snare employs a relaxing snare lock.

Indiana Administrative Code (IAC) contains regulations necessary to implement laws. Mammal damage-related laws and regulations are summarized here.

312 IAC 9. These regulations constitute the "State of Indiana Administrative Code," which is developed annually by the IDNR pursuant IC 14-22, and approved by the Natural Resources Commission of the IDNR. Included in these regulations are recreational hunting and trapping regulations for beavers, foxes, coyotes, skunks, minks, muskrats, long-tailed weasels, raccoons and opossums and squirrels. It also provides regulations on the taking of these species to protect property

312 IAC 9-3-15 Taking beavers, minks, muskrats, long-tailed weasels, red foxes, gray foxes, opossums, skunks, raccoons, or squirrels to protect property....Notwithstanding the requirements of this rule, a resident landowner or a tenant may, without a permit at any time, take a beaver, mink, muskrat, long-tailed weasel, red fox, gray fox, opossum, skunk, or raccoon, fox squirrel, or gray squirrel that is discovered while damaging property. (b) It is unlawful to take A person who takes a mammal under subsection (a) unless the landowner or tenant reports must report the taking to the division director or to a conservation officer within seventy-two (72) hours of the taking. The mammal must be disposed of in a lawful manner. A person must not release a mammal except in the county where the mammal was captured.

312 IAC 9-3-18 Prohibited methods of pursuit and taking furbearing mammal

(a) It is unlawful to take a furbearing mammal with a leg-hold trap possessing saw-toothed or spiked jaws.

- (b) It is unlawful to take a furbearing mammal with a leg-hold trap sized number three (3) or larger without offset jaws unless the trap is completely covered by water.
- (c) It is unlawful to take a furbearing mammal with a Conibear, Dahlgren, Bigelow, or other killer trap which is seven and one-half (7½) inches or larger in diameter or which is larger than seven and one-half (7½) inches by seven and one-half (7½) inches unless the trap is completely covered by water.
- (d) It is unlawful to use a snare to trap a wild animal, except upon land owned by the user or with the written permission of the landowner. No snare shall be used that permits a circumference greater than fifteen (15) inches unless: (1) at least fifty percent (50%) of the loop of the snare is covered by water; or (2) the snare employs a relaxing snare lock (a lock that will allow the snare's loop size to increase once pulling tension is no longer exerted along the snare from its anchored end).
- (e) It is unlawful to disturb the den or house of a mammal protected by sections 11 through 14 of this rule: (1) by shooting, digging, cutting, or chipping into the leaf nest, hole, burrow, tree, or den; or (2) with: (A) the aid of smoke, fire, fumes, chemicals, ferret, or other small animal; or (B) any mechanical device introduced into the hole, burrow, tree, or den; where the animal is hidden or sheltered.
- (f) It is unlawful to wear or use a device to climb poles or trees for the purpose of dislodging a mammal described in sections 11 through 14 of this rule.
- (g) It is unlawful to possess an ax, a saw, or a device to climb poles or trees while in the field or woods at night for the purpose of dislodging a mammal described sections 11 through 14 of this rule.
- (h) It is unlawful to chase or take a furbearing mammal between sundown and sunrise without carrying a continuous shining light which is visible for at least five hundred (500) feet.
- (i) It is unlawful to hunt a furbearing mammal from a boat.

Indiana Pesticide Laws

The use of pesticides in Indiana is conducted pursuant to the Indiana Pesticide Control Regulations (Indiana Administrative Code I.C. 15-3-3.6), which is administered by the OISC. Use of products such as those intended to kill rodents and larger mammals is regulated by the OISC.

1.9 PREVIEW OF THE REMAINDER OF THIS EA

The remainder of this EA is composed of four (4) chapters and six (6) appendices. Chapter 2 discusses the issues relevant to the analysis. Chapter 3 contains a description of each alternative, alternatives not considered in detail, and standard operating procedures (SOP) that may be used by WS. Chapter 4 analyzes environmental consequences and the environmental impacts associated with each alternative considered in detail. Chapter 5 contains the list of preparers and those consulted during the EA process. Appendix A is a list of the literature cited during the preparation of the EA and Appendix B is a detailed description of the methods used for MDM in Indiana. Appendix C is a list of Federal and State protected Threatened and Endangered Species. Appendix D contains the criteria for beaver dam breaching and removal.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

2.0 INTRODUCTION

Chapter 2 contains a discussion of the issues, including issues that received detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues used to develop standard operating procedures (SOPs), and issues not considered in detail, with the rationale. Pertinent portions of the affected environment are included in this chapter and in the discussion of the environmental impacts in Chapter 4.

2.1 AFFECTED ENVIRONMENT

The proposed action could include areas in and around commercial, industrial, public, and private buildings, facilities and properties and at other sites where mammals burrow, feed, or otherwise occur. Examples of areas where MDM activities could be conducted are, but are not necessarily limited to: agricultural fields, orchards, farmyards, dairies, ranches, livestock operations, waste handling facilities, industrial sites, natural areas, government properties and facilities, private homes and properties, corporate properties, schools, hospitals, parks and recreation areas, swimming lakes, communally-owned homeowner/property owner association properties, natural areas, wildlife refuges, wildlife management areas, coastal and tidal beaches, ponds, rivers, and inlets, airports and surrounding areas.

2.2 ISSUES ANALYZED IN DETAIL IN CHAPTER 4

The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

- Effects on target mammal species
- Effects on other wildlife species, including Threatened and Endangered species
- Effects on human health and safety
- Impacts to stakeholders, including aesthetics
- Humaneness and animal welfare concerns of methods used

2.2.1 Effects on Target Mammal Species

Of interest to WS, program recipients, decision-makers, and members of the public is whether wildlife damage management actions adversely affect the viability of target species populations. The target species selected for analysis in this EA include: Mammal species addressed in this EA include but are not limited to: white-tailed deer, coyotes, raccoons, opossums, red fox, gray fox, feral cats, striped skunk, beaver, muskrat, woodchuck, feral swine, domestic/feral dog, brown (Norway) rat, black (roof) rat, house mouse, deer mouse, white-footed mouse, and meadow vole, and plains pocket gopher.

2.2.2 Effects on Other Wildlife Species, including T&E Species

WS and the rest of the wildlife management profession, as well as the public, are concerned about whether the proposed action or any of the alternatives might result in adverse impacts nontarget wildlife species, especially state and federally listed threatened and endangered (T&E) species. WS' SOPs are designed to reduce potential impacts on non-target species' populations and are presented in Chapter 3. To reduce the risks of adverse affects to non-target species, WS would select damage management methods that are target-selective or apply MDM methods in ways to reduce the likelihood of capturing or killing non-target species.

Threatened and Endangered species lists for the USFWS and State of Indiana were reviewed to identify potential effects on federal and state listed T&E species. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or SOPs. WS has consulted with the USFWS under Section 7 of the ESA concerning potential effects of the national WS program on T&E species and has obtained a B.O. from the USFWS. For the full context of the BO, see Appendix F of the ADC FEIS (USDA 1997 Revised). WS has consulted with the State and Federal Endangered species offices on a project by project basis and will consult with the Federal Endangered Species programs prior to the initiation of damage management activities in new areas.

Some members of the public are concerned that the use of registered toxicants to reduce mammal damage would have adverse impacts on other wildlife species, including T&E species. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997 Revised, Appendix P). WS only uses pesticides that have been approved by the EPA and the Indiana Office of the State Chemist and applies these in accordance with the label directions. Under the alternatives proposed in this EA, the primary toxicants proposed for use and recommendation by WS are gas cartridges and zinc phosphide (ZnP) and anticoagulant rodenticides. Appendix B contains detailed descriptions of these chemical products.

Some MDM programs conducted by WS in Indiana are directed at protection of T&E wildlife species. Operational MDM programs conducted by WS at Federal properties (USFWS Wildlife Refuges and U.S. Coast Guard property) in Indiana benefit piping plovers and least terns by reducing predation on these species and their eggs, from raccoons, opossum, red fox, and other mammals. WS' efforts have been a component of integrated management programs that have included nest exclosures, control of human access, and electrified fencing implemented by landowning agencies, and have resulted in stable and increasing productivity and production of these rare bird species on the project areas.

2.2.3 Effects on Human Health and Safety

Safety and efficacy of chemical control methods.

Some individuals may have concerns that chemicals used for wildlife damage management should not be used because of potential adverse effects on people from direct exposure to chemicals or exposure to animals that have died as a result of chemical use.

Under the alternatives proposed in this EA, pesticide products proposed for use by WS are gas cartridges (for rodent control) and ZnP and anticoagulant rodenticides. WS may also provide technical assistance on the use of repellents. Use of these products is regulated by the EPA through FIFRA, the OISC, and by WS Directives. The use of registered chemical toxicants and repellants for MDM poses no risk to public health and safety when applied according to label instructions. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997 Revised, Appendix P). Chemical pesticides that have come into use since the Risk Assessment was completed have undergone considerable environmental review through EPA and State registration processes, which means they have been found to present no unreasonable risk to the environment or human health and safety when used according to label directions." (this verbage is consistent with what FIFRA says EPA has to assure when they register a pesticide WS personnel who apply pesticides are certified pesticide applicators and apply pesticides according to label instructions. A detailed description of these chemicals is contained in Appendix B.

WS also uses FDA registered chemicals for animal immobilization and euthanasia. Some individuals are concerned that the drugs used in animal capture, handling, and euthanasia may cause adverse health effects in humans that hunt and eat the species involved.

Impacts on human safety of non-chemical MDM methods

Some people may be concerned that WS's use of firearms, traps, snares and pyrotechnic scaring devices could cause injuries to people. WS personnel occasionally use traps, snares and firearms to remove mammals that are associated with damage. There is some potential fire hazard to agricultural sites and private property from pyrotechnic use.

Firearm use is a very sensitive issue and a concern because of public fears regarding the risks associated with unsafe firearms use and the threat of misuse of firearms. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Impacts on human health and safety from mammals

The concern stated here is that the absence of adequate MDM would result in adverse effects on human health and safety, because mammal damage would not be curtailed or reduced to the minimum levels possible and practical. The potential impacts of not conducting such work could lead to increased incidence of injuries, illness, or loss of human lives.

2.2.4 Impacts to Stakeholders, including Aesthetics

Aesthetics is a philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is subjective in nature and is dependent on what an observer regards as beautiful. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. There may be some concern that the proposed action or alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using the animal or intending to) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception, and today a large percentage of households have pets. Some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals. Others may experience anxiety or fear when wild animals come into close proximity to their homes and families. It is not surprising that the public reaction to wildlife damage management techniques is mixed because there are numerous philosophical, aesthetic, and personal

attitudes, values, and opinions about the best ways to reduce conflicts/problems between humans and wildlife.

Many people, directly affected by problems and threats to public health or safety associated with mammals may insist upon removal of the animal(s) from the property or public location when they cause damage. Some members of the public have an idealistic view and believe that all wildlife should be captured and relocated to another area to alleviate damage or threats to public health or safety. Others, directly affected by the specific wildlife "problem", may not agree that there is a problem. They may perceive that the issue at hand is normal animal behavior and a consequence of living in proximity to nature and should be tolerated. Similarly, individuals not directly affected by the harm or damage caused by wildlife may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Individuals totally opposed to MDM want WS to teach tolerance for damage and threats to public health or safety, and that wildlife should never be killed. Some people would strongly oppose removal of mammals regardless of the amount and type of damage. Some members of the public who oppose removal of wildlife do so because of human-affectionate bonds with individual animals. These human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment. Advocates of the Animal Rights philosophy believe that animals are entitled to the same rights and protections as humans and that if an action is unacceptable treatment for a human it is unacceptable treatment for an animal.

The WS program in Indiana only conducts wildlife damage management at the request of the affected property owner or resource manager. If WS received requests from an individual or official for MDM, WS would address the issues/concerns and consideration would be made to explain the advantages and disadvantages of the available damage management actions available. Management actions would be carried out in a caring, humane, and professional manner.

2.2.5 Humaneness and Animal Welfare Concerns of Methods Used

Humaneness, in part, is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently.

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important and very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if "... *the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process.*" Suffering is described as a "... *highly unpleasant emotional response usually associated with pain and distress.*" However, suffering "... *can occur without pain . . . ,*" and "... *pain can occur without suffering . . .*" (AVMA 1987). Because suffering carries with it the implication of a time frame, a case could be made for "... *little or no suffering where death comes immediately . . .*" (CDFG 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would "... *probably be causes for pain in other animals . . .*" (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to considerable pain (CDFG 1991).

The AVMA states "... *euthanasia is the act of inducing humane death in an animal*" and "... *the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness.*" (AVMA 2001). Some people would prefer AVMA accepted methods of euthanasia to be used when killing all animals, including wild and feral animals. The AVMA states that "*For wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible. In field circumstances, wildlife biologists generally do not use the term euthanasia, but terms such as killing, collecting, or harvesting, recognizing that a distress-free death may not be possible.*" (AVMA 2001).

The decision-making process involves tradeoffs between the above aspects of pain and humaneness. Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. For example, some individuals may perceive techniques used to remove a predator that is killing or injuring pets or livestock as inhumane, while others may believe it is equally or more inhumane to permit pets and livestock that depend upon humans for protection to be injured or killed by predators. One challenge with coping with this issue is how to achieve the least amount of animal suffering within the constraints of current technology and resources. WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some MDM methods are used in situations where non-lethal damage management methods are not practical or effective.

Indiana WS personnel are experienced and professional in their use of management methods so that they are humane within the constraints of current technology and resources. Standard operating procedures used to maximize humaneness are described in Chapter 4.

2.3 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

2.3.1 No Wildlife Damage Management at Taxpayer Expense; Wildlife Damage Management should be Fee Based

Funding for WS comes from a variety of sources in addition to federal appropriations. In Indiana, funds to implement wildlife damage management activities and programs are derived from a number of sources, including, but not limited to Federal, state, county and municipal governments/agencies, private organizations, corporations and individuals, homeowner/property owner associations, and others, under Cooperative Service Agreements and/or other contract documents and processes (Indiana WS state report, <http://www.aphis.usda.gov/ws/statereports/indiana.html>). Federal, state, and local officials have decided that wildlife damage management should be conducted by appropriating funds. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Wildlife damage management is an appropriate sphere of activity for government programs, since aspects of wildlife damage management are a government responsibility and authorized and directed by law.

2.3.2 Mammal Damage Should be Managed by Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce mammal damage for property owners or property owners could attempt to reduce their own damage problems. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense, or because they prefer to use a private business rather than a government agency. However, some property owners would prefer to contract with a government agency. In particular, large industrial businesses and cities and towns may prefer to use WS because of security and safety issues and reduced administrative burden. The relationship between WS and private industry is addressed in WS directive 3.1.1 (<http://www.aphis.usda.gov/ws/directives/3101.pdf>).

2.3.3 Appropriateness of Preparing an EA (Instead of an EIS) for Such a Large Area

Some individuals might question whether preparing an EA for an area the size of the State of Indiana would meet the NEPA requirements for site specificity. If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire State may provide a better analysis than multiple EAs covering smaller zones. In addition, the WS program in Indiana only conducts MDM on a relatively small area of the State where damage is occurring or likely to occur.

2.3.4 Effectiveness of Mammal Damage Management Methods

A concern among members of the public is whether the methods of reducing mammal damage will be effective in reducing or alleviating damage and conflicts. The effectiveness of each method or methods can be defined in terms of decreased potential for health risks, decreased human safety hazards, reduced property damage, reduced agricultural damage, and reduced natural resource damage. In terms of the effectiveness of a specific method or group of methods, this would not only be based on the specific method used, but more importantly upon the skills and abilities of the person implementing the control methods and the ability of that person to determine the appropriate course of action to take. It would be expected that the more experience a person has in addressing mammal damage conflicts and implementing control methods the more likely they would be in successfully reducing damage to acceptable levels. The WS technical assistance program provides information to assist persons in implementing their own MDM program, but at times the person receiving WS technical assistance may not have the skill or ability to implement the MDM methods recommended by WS. Therefore, it is more likely that a specific MDM method or group of methods would be effective in reducing damage to acceptable levels when WS professional wildlife damage assistance is provided than that would occur when the inexperienced person attempts to conduct MDM activities.

CHAPTER 3: ALTERNATIVES

3.0 INTRODUCTION

This chapter consists of seven parts: 1) introduction, 2) description of alternatives considered and analyzed in detail including the Proposed Action (Alternative 2), 3) MDM approaches used by WS, 4) methods that could be authorized for use or recommended by WS, 5) methodologies recommended but deemed impractical, ineffective, or unsafe at the present time, 6) a description of alternatives considered, but eliminated from detailed analysis, and 7) standard operating procedures. Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992), Methods of Control (USDA 1997 Revised), and "*Risk Assessment of Wildlife Damage Control Methods Used by the USDA Animal Damage Control Program*" (USDA 1997 Revised).

Four alternatives were recognized, developed, and analyzed in detail. An additional three alternatives were considered, but not analyzed in detail. The five alternatives analyzed in detail are:

Alternatives analyzed in detail are:

- Alternative 1: Technical Assistance Only.
- Alternative 2: Integrated Mammal Damage Management Program. (Proposed Action/No Action)
- Alternative 3: Non-lethal Mammal Damage Management Only By WS
- Alternative 4: No federal WS Mammal Damage Management.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1: Technical Assistance Only

This alternative would not allow for WS operational MDM in Indiana. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, corporations, or others could conduct MDM using any legal lethal or non-lethal method available to them.

3.1.2 Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

The No Action alternative is a procedural NEPA requirement (40 CFR 1502.14(d)) and is a viable and reasonable alternative that could be selected and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with guidance from the CEQ (CEQ 1981). In this guidance, the No Action alternative for situations where there is an ongoing management program may be interpreted as "no change" from current management direction or level of management intensity.

WS proposed to continue the current damage management program that responds to mammal damage in the State of Indiana. WS involvement in MDM in Indiana is closely coordinated with the Indiana Department of Natural Resources, and WS take of mammals is authorized through permits and/or other authorities granted by IDNR. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce mammal damage to property, agricultural resources, and natural resources, and to reduce mammal impacts on human/public health and safety. Damage management would be conducted on public and private property in Indiana when the resource owner (property owner) or manager requests assistance. The IWDM strategy would encompass the use and recommendation of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate non-

lethal techniques like physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, mammals would be removed as humanely as possible using shooting, trapping, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy.

3.1.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

This alternative would require WS to only use and recommend non-lethal methods to resolve mammal damage problems. Information on lethal MDM methods would still be available to producers and property owners through other sources such as IDNR, USDA Agricultural Extension Service offices, universities, or pest control organizations. Requests for information regarding lethal management approaches would be referred to these entities. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS direct assistance with non-lethal MDM, use contractual services of private businesses, or take no action. Persons receiving WS's non-lethal technical and direct control assistance could still resort to lethal methods that were available to them.

3.1.4 Alternative 4: No Federal WS Mammal Damage Management

This alternative would eliminate WS involvement in MDM in Indiana. WS would not provide direct operational or technical assistance and requesters of WS's assistance would have to conduct their own MDM without WS input. Information on MDM methods would still be available to producers and property owners through other sources such as IDNR, USDA Agricultural Extension Service offices, universities, or pest control organizations. Requests for information would be referred to these entities. Individuals might choose to conduct MDM themselves, use contractual services of private businesses, or take no action.

3.2 MAMMAL DAMAGE MANAGEMENT STRATEGIES USED BY WS

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2 and 3 described above. Alternative 4 would terminate both WS technical assistance and operational MDM by WS. Appendix B is a more thorough description of the methods that could be used or recommended by WS.

3.2.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in the most cost-effective⁴ manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (e.g., animal husbandry), habitat modification (e.g., exclusion), animal behavior modification (e.g., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

⁴ The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

3.2.2 The IWDM Strategies Employed by WS

Technical Assistance Recommendations

“Technical assistance” as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods and approaches. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for use by non-WS entities. Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application. In some instances, wildlife-related information provided to the requestor by WS results in tolerance/acceptance of the situation. In other instances, management options are discussed and recommended.

Under APHIS NEPA implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving mammal damage problems.

Direct Damage Management Assistance (Direct Control)

Direct damage management assistance includes damage management activities that are directly conducted or supervised by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone and when *Agreements for Control* or other comparable instruments are provided for direct damage management by WS. The initial investigation defines the nature, history, and extent of the problem; species responsible for the damage; and methods available to resolve the problem. The professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary or if the problems are complex.

Educational Efforts

Education is an important element of WS program activities because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures, courses, and demonstrations are provided to producers, homeowners, state and county agents, colleges and universities, and other interested groups. WS frequently cooperates with other agencies in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that WS personnel, other wildlife professionals, and the public are periodically updated on recent developments in damage management technology, programs, laws and regulations, and agency policies.

Research and Development

The National Wildlife Research Center (NWRC) functions as the research arm of WS by providing scientific information and development of methods for wildlife damage management that are effective and environmentally responsible. NWRC scientists work closely with wildlife managers, researchers, field specialists and others to develop and evaluate wildlife damage management techniques. NWRC scientists have authored hundreds of scientific publications and reports, and are respected world-wide for their expertise in wildlife damage management.

Examples of WS Direct Operational and Technical Assistance in MDM in Indiana

- WS has cooperative agreements with the Federal Aviation Administration (FAA) and some Indiana airports for the purpose of assessing, managing, and monitoring wildlife-related public safety and aviation hazards at airports. Mammal-aircraft strikes and hazards involving white-tailed deer, red fox, coyotes, and other mammals have created safety hazards at Indiana airports. Since 2000, WS implemented an IWDM approach consisting of technical assistance and direct

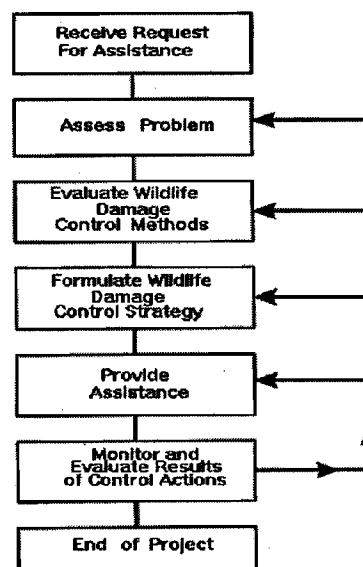
control components including: WS review of airport development and landscaping plans, habitat management recommendations, provision of training to airport personnel, threatened and endangered species monitoring, hazardous mammal species population management, and exclusion. WS involvement at Indiana airports has considerably reduced or prevented strikes with mammals at airports.

- The Indiana Department of Natural Resources (IDNR) and Purdue Cooperative Extension Service (CES) have entered into a MOU and a cooperative service agreement to establish a toll-free telephone service (Hotline) and companion web site to provide a free information resource to Indiana residents on science-based, environmentally sound MDM alternatives. During FY 03, the Hotline responded to 4,570 calls for assistance in resolving mammal damage conflicts. During this same time period, the website received 14,490 hits on resolving wildlife damage conflicts, including those caused by mammals.

3.2.3 WS Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints which is depicted by the WS Decision Model and described by Slate et al. (1992) (Figure 3-1). WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate to reduce damage. WS personnel assess the problem then evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, methods deemed to be practical for the situation are incorporated into a management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions.

Figure 3.1 WS Decision Model as presented by Slate et al. (1992) for developing a strategy to respond to a request for assistance with human-wildlife conflicts.



3.3 MAMMAL DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE (See Appendix B for a more detailed description of each method or approach.)

3.3.1 Non-lethal Methods

Non-lethal methods are often used by the cooperators before and/or after requesting assistance from WS. It is not unusual for cooperators to have already tried non-lethal methods prior to requesting assistance from WS. In a 2005 NASS Nationwide survey of cattle producers, Indiana cattle producers reported using frequent checking (47%), culling of sick/injured animals (36.4%), livestock carcass removal (26.7%), livestock guarding animals (23.7%), night penning (19.6%), exclusion fencing (17.1%), frightening devices (5.7%), and herding (2.3%) to prevent predation losses (NASS 2006). In a similar 2004 survey, sheep producers, reported using fencing (58%), shed lambing (52.7%), culling of sick/injured animals (42.6%),

night penning (39.3%), frequent checks (36.5%), changing bedding (34.5%), carcass removal (27.1%), guard dogs (23.4%), guard llamas (19.3%), guard donkeys (7.6%), herding (6.4%), and frightening devices (3.4%) to prevent predation losses (NASS 2005).

Exclusion prevents wildlife access to protected resources through fencing, netting, or other physical barriers.

Cultural methods and habitat modifications are typically implemented by agricultural producers or property owners. They consist primarily of non-lethal preventive methods which minimize exposure and/or reduce the amount or attractiveness of the protected resource to wildlife that would cause damage or pose a threat. A few examples of these types of techniques are: removal of beaver dams, installation of water control devices, planting lure crops, providing alternate foods changing animal husbandry practices, switching to short variety crops, picking less palatable varieties of landscape plants, providing raptor perching poles, and keeping the vegetation around the protected resource short.

Animal behavior modification refers to tactics that alter the behavior of mammals to reduce damage. Some but not all of these tactics include the following:

- Propane exploders
- Pyrotechnics
- Distress calls and sound producing devices
- Visual repellents and other scaring tactics
- Livestock guarding animals

Live capture and release is through use of cage traps designed to capture mammals alive. Captured target mammals can then be relocated to other field locations or to animal shelters, pursuant to State laws and regulations. Alternatively, when monitoring for diseases in wildlife, samples may be collected and then the animal is released at the capture site.

Capture Devices, including Hancock/Bailey Traps, corral traps, and box/cage traps are used to capture wildlife. Snares can also be modified to live-capture animals. These devices hold the animal until the Specialist arrives and relocates the animal. These devices can be used as lethal methods if the specialist euthanizes the captured animals via gunshot or euthanasia chemicals discussed below.

Repellents are usually naturally occurring substances that are chemically formulated to be distasteful or to elicit pain or discomfort to target animals when they are encountered. In Indiana, wildlife repellents are registered with the OISC.

Drugs such as anesthetics (Ketamine, Telazol), sedatives (analgesics) (Xylazine), and accessory drugs (Yohimbine, antibiotics, etc.) are used to capture, sedate, and handle animals involved in wildlife damage or disease situations. These and other drugs are available for WS use, pursuant to State and Federal regulations, and are identified as approved drugs by the WS program through its Immobilization and Euthanasia Committee.

3.3.2 Lethal Methods

Capture Devices, including body-gripping traps (Conibear), snap traps, snares kill the animal captured. Non-lethal capture devices as discussed above can also be used as lethal methods when the captured animal is killed via shooting or euthanasia chemicals,

Shooting is helpful in some situations to supplement and reinforce other dispersal techniques and to kill mammals that are legally trapped. It is selective for target species and may be used in conjunction with the use of spotlights, calling, and other alternative legal tools (elevated positions, stands, etc.). Shooting with

firearms is sometimes used to manage mammal damage problems when lethal methods are determined to be appropriate. The animals are killed as quickly and humanely as possible.

Sport harvest through hunting and trapping is often an important part of MDM strategies and is recommended by WS to enhance the effectiveness of other damage management techniques and to accomplish population management objectives developed by the IDNR.

Toxicants such as gas cartridges, large gas cartridges, and ZnP Concentrate for Rodent and Lagomorph Control (registered with the OISC by WS), and other toxicants (registered by other entities; Appendix B) may be used and recommended to lethally control mice, woodchucks, and other mammals associated with damage. Label directions are followed, and application by WS occurs at specific sites, pursuant to landowner requests and all pertinent laws, regulations, and policies.

Carbon dioxide (CO₂) gas is an AVMA-approved euthanasia method (AVMA 2001) which is sometimes used to euthanize mammals that have been chemically immobilized or captured in live traps. Live animals are placed in an enclosed space into which CO₂ gas is released. The animals quickly expire after inhaling the CO₂.

Euthanasia agents (Sodium Pentobarbital and its derivatives, Potassium Chloride) are used euthanize animals involved in wildlife damage or disease situations. These and other drugs are available for WS use, pursuant to State and Federal regulations, and are identified as approved drugs by the WS program through its Immobilization and Euthanasia Committee.

3.4 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered, but not analyzed in detail. These were:

3.4.1 Lethal Mammal Damage Management Only By WS

Under this alternative, WS would not conduct any non-lethal control of mammals for MDM purposes in the State, but would only conduct lethal MDM. This alternative was eliminated from further analysis because some mammal damage problems can be resolved effectively through non-lethal means. Additionally, lethal methods may not always be available for use due to safety concerns or local ordinances prohibiting the use of some lethal methods, such as the discharge of firearms.

3.4.2 Compensation for Mammal Damage Losses

The compensation alternative would require the establishment of a system to reimburse persons impacted by mammal damage. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the ADC FEIS indicated that the concept has many drawbacks (USDA 1997 Revised):

- It would require larger expenditures of money and labor to investigate and validate all damage claims to determine and administer appropriate compensation.
- Compensation would most likely be less than full market value. Responding in a timely fashion to all requests to assess and confirm damage would be difficult and certain types of damage could not be conclusively verified. For example, proving conclusively in individual situations that mammals were responsible for disease outbreaks would be impossible, even though they may actually have been responsible. Thus, a compensation program that requires verification would not meet its objective for mitigating such losses.

- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.
- Not all resource owners would rely completely on a compensation program and unregulated lethal control would most likely continue as permitted by state law.
- Compensation would not be practical for reducing threats to human health and safety.

3.4.3 Reproduction Control

Reproductive control is often considered for use where wildlife populations are overabundant and where traditional hunting or lethal control programs are not publicly acceptable (Muller et al. 1997). Use and effectiveness of reproductive control as a wildlife population management tool is limited by population dynamic characteristics (longevity, age at onset of reproduction, population size and biological/cultural carrying capacity, etc.), habitat and environmental factors (isolation of target population, cover types and access to target individuals, etc.), socioeconomic and other factors. Population modeling indicates that reproductive control is more efficient than lethal control only for some rodent and small bird species with high reproductive rates and low survival rates (Dolbeer 1998). Additionally, the need to treat a sufficiently large number of target animals, requirements for repeated treatments with some contraceptive products, and population dynamics of free-ranging populations place considerable logistic and economic constraints on the adoption of reproduction control technologies as a wildlife management tool for some species. Research into reproductive control technologies, however, has been ongoing, and the approach will probably be considered in an increasing variety of wildlife management situations.

Reproductive control for wildlife could be accomplished either through sterilization (permanent) or contraception (reversible).

Sterilization could be accomplished through:

- Surgical sterilization (vasectomy, castration, and tubal ligation),
- Chemosterilization
- Gene therapy.

Contraception could be accomplished through:

- Hormone implantation (e.g., synthetic steroids such as progestins)
- Immunocontraception (e.g., contraceptive vaccines)
- Oral contraception (e.g., progestin administered daily).

Research into the use of these techniques consists of laboratory/pen experimentation to determine and develop the sterilization or contraceptive material or procedure, field trials to develop the delivery system, and field experimentation to determine the effectiveness of the technique in achieving population reduction. Prior to implementation, the product must be registered and approved by the appropriate federal and state regulatory agencies.

The use of hormones was investigated (Matschke 1976, 1977 a, b, c, Roughton 1979), and eventually rejected as an effective and efficient reproductive control technique for deer. Additionally, concerns related to costs and logistics of widespread distribution of drugged baits, dosage control and ingestion of baits by children and nontarget animals make oral contraception (by steroids) largely impractical (Lowery et al. 1993). More recently, immunocontraception has been studied in various situations and locations, but its potential use appears limited due to considerable constraints regarding treatment and follow-up treatment of a sufficiently large number of target animals, varying immunogenicity of vaccines, genetic backgrounds of individual animals, age, nutritional status, stress and other factors (Becker and Katz 1997, Becker et al.

1999). Immunocontraceptive vaccines prevent conception by stimulating the production of antibodies that bionutralize proteins or hormones essential for reproduction (Miller et al. 2000). The use of porcine zona pellucida (PZP) as a contraceptive agent in wildlife management has been investigated recently (Kirkpatrick et al. 1990, Turner and Kirkpatrick 1991, Turner et al. 1992 and 1996), but to date, there is no published documentation that immunocontraceptive vaccines have successfully reduced any free-ranging deer herd or population. Additionally, Underwood and Verret (1998) reported that despite 5 years of PZP treatment, the Fire Island, NY white-tailed deer population continued to grow, albeit at a slower rate.

Other components of the reproductive system have been studied for immunocontraception as well, such as GnRH (Becker and Katz 1997, Becker et al. 1999). The USDA/APHIS/WS National Wildlife Research Center (NWRC) has been instrumental in the development of a single-injection GnRH immunocontraceptive vaccine (GonaCon™) which has been shown to provide contraceptive effects lasting up to 2 years without needing booster vaccination (Miller and Killian 2002, NWRC 2004). The NWRC is working with the Food and Drug Administration to obtain registration of this product for use as a new animal drug. Although the GnRH immunocontraceptive appears promising, it has limitations. GnRH has been documented to have adverse impacts on antler growth in male deer (Miller and Killian 2001). If true, then it may be necessary to determine a way to only treat female deer or application may be limited to fenced-in sites where shifts in antler growth will not have as great an impact on the recreational and aesthetic value of the deer, or areas where cooperators have decided that the reduction in reproduction is worth the cost of altered antler growth in bucks (Killian et al. 2005).

Canadian researchers at Dalhousie University (Halifax, Nova Scotia) investigated the use of a single-dose immunocontraceptive vaccine based on liposome delivery of PZP antigens (Spay Vac™), and reported a 90% reduction in pup production by gray seals (*Halichoerus grypus*) (Brown et al. 1997). Fraker et al. (in press) reported that fertility of an island population of fallow deer (*Dama dama*) was greatly reduced by a single administration of Spay Vac™ during the first year of treatment. However, SpayVac, has failed in field trials in Princeton, CT and the manufacturer has stated that it will discontinue efforts to register the product with the U.S. Food and Drug Administration for the time being (Campbell 2005).

Turner et al. (1993) note that although contraception in white-tailed deer may be used to limit population growth, it will not reduce the number of animals in excess of the desired level in many circumstances. They further contend that initial population reductions by various other means may be necessary to achieve management goals, and that reproduction control would be one facet of an integrated program. In sum, although immunocontraceptive technology has been variously effective in laboratories, pens, and in island field applications, it has not been effective in reducing populations of free-ranging white-tailed deer.

Development of a single-shot sterilization technique as an alternative to immunocontraception was investigated by Rutgers University scientists in 2000. One possible approach is gene therapy which could accomplish reproductive control via sterilization through producing death of the anterior pituitary cells that synthesize luteinizing hormone (LH), which triggers ovulation in females and spermatogenesis in males. Efficacy testing and development of a delivery system will be investigated over the next few years.

The use of reproductive control is subject to Federal and State regulation. Additionally:

- No chemical or biological agent to accomplish reproductive control for free-ranging mammals has been approved for operational use by Federal and Indiana authorities.
- If an effective tool was legally available, and if the project area was fenced, it would still take many years for some mammal populations to stabilize at a lower level, and ongoing damage would continue to occur at unacceptably high levels, and
- There are considerable logistic, economic and socio-cultural limitations to trapping, capturing and chemical treatment of the hundreds or thousands of mammals that would be necessary to affect an eventual decline in the population.

Because there is no tool currently available for field application, and due to considerable logistic, economic, and socio-cultural limitations to the use of fertility control on free-ranging mammals, this approach is not considered for further analysis in this EA. However research into this area of wildlife damage management continues. WS will monitor new developments and, where practical and appropriate, could incorporate this technique into its program after necessary NEPA review is completed.

3.5 STANDARD OPERATING PROCEDURES FOR MAMMAL DAMAGE MANAGEMENT TECHNIQUES

3.5.1 Standard Operating Procedures (SOPs)

The current WS program, nationwide and in Iowa has developed SOPs for its activities that reduce the potential impacts of these actions on the environment. These procedures are discussed in detail in Chapter 5 of the WS FEIS (USDA 1997 Revised). Some key standard operating procedures pertinent to the proposed action and alternatives of this EA include:

- The WS Decision Model thought process is used to identify effective wildlife damage management strategies and their effects.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.
- EPA-approved label directions are followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects to the environment when chemicals are used in accordance with label directions.
- All WS biological personnel in Indiana using restricted chemicals and controlled substances (immobilization and euthanizing drugs) are trained and certified by, or operate under the direct supervision of, program personnel or others who are trained in the safe and effective use of chemical MDM materials. Management controls are in place within WS and its Immobilization and Euthanasia Committee to maintain personnel training and certification.
- Research is being conducted to improve MDM methods and strategies so as to increase selectivity for target species, to develop effective non-lethal control methods, and to evaluate non-target hazards and environmental effects of MDM techniques

3.5.2 Additional SOPs Specific to the Issues

The following is a summary of additional SOPs that are specific to the issues listed in Chapter 2 of this document.

- Management actions would be directed toward localized populations or groups of target species and/or individual offending members of those species. Generalized population suppression across the State, or even across major portions of the State, would not be conducted.
- WS uses MDM devices and conducts activities for which the risk of hazards to public safety and hazard to the environment have been determined to be low according to a formal risk assessment (USDA 1997 Revised, Appendix P). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public is even further reduced.
- WS personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding non-target take.

- WS has consulted with the USFWS regarding potential effects of the National WS program methods on T&E species and abides by reasonable and prudent alternatives and/or reasonable and prudent measures established as a result of that consultation. For the full context of the Biological Opinion, see the WS FEIS, Appendix F (USDA 1997 Revised).
- WS has consulted with the IDNR Endangered and Non-game Species program regarding potential effects of MDM on State-listed threatened and endangered species.
- WS will also consult with the State and Federal Endangered Species programs prior to the initiation of damage management activities in new areas.
- WS uses chemical methods for MDM that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.
- All WS actions are conducted in accordance with applicable state, federal and local laws, including regulations mandating that traps be checked at least once every 24 hours.
- WS policy (2.45) requires that appropriate warning signs be posted on main entrances or commonly used access points to areas where foothold traps, snares or rotating jaw (conibear-type) traps are in use.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. The environmental consequences of each alternative are analyzed in comparison with the no action alternative (Alternative 2) to determine if the real or potential effects would be greater, lesser, or the same.

The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, visual resources, air quality, prime and unique farmlands, timber, and range. These resources will not be analyzed further.

Cumulative Effects: Cumulative effects are discussed in relationship to each of the alternatives analyzed, with emphasis on potential cumulative effects from methods employed, and including summary analyses of potential cumulative impacts to target and non-target species, including T&E species.

Irreversible and Irretrievable Commitments of Resources: Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

Effects on sites or resources protected under the National Historic Preservation Act: WS MDM actions are not undertakings that could adversely affect historic resources (See Section 1.8.3).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

4.1.1 Effects on Target Mammal Species Populations

4.1.1.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would have no impact on target mammal populations in the State because the program would not provide any operational MDM activities. The program would be limited to providing advice only. It is likely that most landowners/resource managers would continue to attempt to do something about their mammal damage as permitted under Indiana state law. Cumulative impacts on target species populations would be variable depending upon actions taken by affected landowners/resource managers and the level training and experience of the individuals conducting the MDM. Some individuals experiencing damage may take illegal or unsafe action against the problem species either unintentionally due to lack of training, or deliberately out of frustration of continued damage. In these instances, more target species may be taken than with a professional WDM program (Alternatives 2). Use of WS technical assistance may decrease the risks associated with uninformed use of lethal management techniques and may increase the use of non-lethal alternatives over that expected in the absence of any WS involvement (Alternative 4). Overall impacts on target species populations would be similar to or slightly higher than Alternative 2 depending upon the extent to which resource managers use the technical assistance provide by WS. However, for the reasons presented in the population effects analysis in section 4.1.1.2, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

4.1.1.2 Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997 Revised). Magnitude is described in USDA (1997 Revised) as "... a measure of the number of animals killed in relation to their abundance." Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage. Tables 4-1 and 4-2 identify the number of animals taken and harassed by species by WS during FY2002-FY2004.

Table 4-1. Wild mammals lethally removed by WS for Mammal Damage Management during FY 2002 through FY 2004 in Indiana.

Species	Cage Trap	Snare	Shooting	Non-Chemical /Other*	Total
White-tailed Deer	0	0	22	0	22
Red Fox	0	0	2	0	2
Virginia Opossum	0	0	1	0	0
Raccoon	2	2	2	0	6
Striped Skunk	3	0	2	0	5
Coyote	0	10	13	0	23
Cottontail Rabbit	0	0	14	0	14

* This category includes snap traps.

Table 4-2. Number of mammals harassed or killed by WS during mammal damage management activities during FY 2002 through FY 2004 in Indiana.*

	Airports		Other Sites		Total	
	Dispersed	Killed	Dispersed	Killed	Dispersed	Killed
Coyotes	0	23	0	0	0	23
Deer	0	22	0	0	0	22
Dogs (Feral)	0	0	0	0	0	0
Field Mice	0	0	0	0	0	0
Feral Cats	0	0	0	0	0	0
Fox	2	2	0	0	2	2
Opossums	4	1	0	0	4	1
Raccoons	0	6	0	0	0	6
Skunks	0	5	0	0	0	5
Cottontail Rabbits	0	14	0	0	0	14

* This is only the number of animals harassed by WS employees. Non-lethal techniques like harassment are often performed by the cooperator with only technical assistance from WS. The WS database does not include information on the number of animals harassed by cooperators so this data does not represent the full extent to which harassment has been used.

White-Tailed Deer

The IDNR is responsible for the management and monitoring of the state's white-tailed deer. The IDNR manages deer in accordance with their white-tailed deer strategic plan (<http://www.in.gov/dnr/fishwild/hunt/deer/deerplan.htm>). Deer population trends and public satisfaction with IDNR deer management efforts are monitored by examining harvest data, a deer-vehicle collision index, a crop damage index, and deer hunter and farm operator survey data. The state uses a county-based deer population model and sets harvest limits on a county by county basis. To date, WS' involvement in deer damage management has been primarily at airports. WS work at airports in Indiana has resulted in the removal of 0 white-tailed deer in FY 2002, 17 deer in FY 2003 and 5 deer during FY 2004. Based upon an anticipated increase in future requests for WS assistance at Indiana airports, WS predicts that no more than 25 white-tailed deer would be lethally removed annually.

Overall, the state's deer population is healthy and productive (Walker 2001). Although the state wide deer population has remained relatively stable for the past several years, significant increases in local areas have occurred. These localized increases are likely due to a number of factors, including poor hunter access to land occupied by deer, local and state ordinances limiting hunting and/or discharge and use of firearms, and bows, improved habitat, and better deer habitat management practices. In accordance with the management goals and strategies identified in the Indiana White-tailed Deer Strategic Plan (<http://www.in.gov/dnr/fishwild/hunt/deer/deerplan.htm>), total deer harvest has increased annually since 2000. For the period of 2002-2004, annual sport harvest of deer increased from 104,428 deer to 123,058 deer. Three of the 7 white-tailed deer management objectives (Objectives 3, 4, and 6) address problems associated with high deer densities.

Special Purpose Deer Control Permit Program The IDNR is authorized to issue Special Purpose Deer Control Permits as necessary to achieve program goals and address issues of concern to the public. WS activities to manage deer hazards at airports (discussed above) have been covered under these types of permits. Deer taken by volunteers and IDNR personnel during deer herd reduction programs at State Parks are also covered under these permits. Total deer taken under special purpose permits was 1,693 (WS - 0) in 2002, 1,281 (WS - 17) in 2003 and 1,300 (WS - 5) in 2004.

Deer Damage Control Permits Indiana has a tiered approach when dealing with deer damage occurring on commercial or non-commercial property. Of land exhibiting deer damage, most complaints are observed on agricultural properties. A landowner complaint results in an inspection by a biologist who will discuss non-lethal and lethal options. If lethal options are deemed appropriate, Deer Damage Control Permits for out-of-season hunting may be issued. During 2003, 228 damage reports were filed, with soybeans and corn being the most frequently damaged crop. During the 2003 Deer Damage Control Permit program, 302 control permits were issued statewide, resulting in 1,282 deer harvested (L. McNew pers. Comm., 2004). Data were not available from IDNR for 2002 or 2004. A figure of 1,500 deer was used in the following calculations of cumulative take

WS's involvement in deer damage management and disease surveillance covered under this EA could include property protection, natural resources protection, public health and safety projects, deer damage management in high security areas such as electrical plants, as well as industrial facilities, agricultural facilities, research facilities, and municipalities. Cumulative annual take of deer in Indiana during 2002-2004 ranged from 107,621 - 125,858. Deer damage management actions by WS accounted for less than 0.02% of the total annual take in the state. Based upon an anticipated increase in requests for assistance, WS's cumulative (airport work covered under USDA 2002), and work addressed in this EA) lethal management of white-tailed deer in Indiana would be expected to be no more than approximately 500 animals in any one year under the

Proposed Action. Annual take of 500 deer is approximately 0.44% of the average annual sport take from 2002 to 2004 (114,343 deer). WS' actions may result in localized reductions in deer density. However, given the reproductive capacity of deer, the relatively high density of deer and the state, and the high mobility of deer, these reductions would only be short-term. Given the above information and IDNR oversight, WS' limited lethal take of deer in Indiana should have minimal effects on local or statewide white-tailed deer populations. The IDNR concurs that the action take by WS will not have any negative impacts on the state's deer population. WS take of deer pursuant to Special Purpose Deer Control Permits, Agricultural Permits to Kill Depredating Deer and/or other authorities, would contribute positively to the IDNR's deer population management goals relating to deer population reduction and control of deer-related damage.

Table 4-3. Cumulative white-tailed deer harvest and animals taken for damage management in Indiana, 2002-2004

Type of Deer Removal	Year		
	2002	2003	2004
Sport Hunting	104,428	106,986	123,058
Special Purpose Deer Control Permits	1,693/0	1,281/17	1,300/5
Total/WS			
Deer Damage Control Permits	1,500*	1,282	1,500*
Total	107,621	109,549	125,858

* 2002 and 2004 data were not available from IDNR so an estimate of 1,500 was used.

Furbearers

The IDNR is responsible for the management of the state's furbearers including raccoons, coyotes, red foxes, gray foxes, beavers, muskrats, skunks and opossums) populations. At this time IDNR does not conduct population census for most of these species, but does monitor the sale of hides. Total fur harvest for target species in this EA are provided in Table 4-3. Currently, IDNR has open seasons for these species, but there are no bag or possession limits.

During FY 2004 WS killed 3 individual furbearers that included 3 coyotes. Based upon an anticipated increase in future requests for WS assistance at Indiana airports, WS anticipates that no more than 200 individual furbearers of those listed in Section 1.2 would be lethally removed annually. Given that WS' take on these species would be minimal in relation to the state's liberal harvest regulations for these species, and that WS take of these species is done in coordination with and supervision of IDNR, there will no adverse impacts on furbearer populations from the proposed action.

Table 4-3. Annual take of furbearers in Indiana for the period of 2002/03 through 2004/05.

Species	Hides Sold ^{1,2}			WS Take			Non-WS Take ³
	2002	2003	2004	2002	2003	2004	2004
Coyotes	1,713 (S)	1,982 (I)	4,470 (I)	9	7	7	141
Gray Foxes	240 (S)	370 (I)	530 (I)	0	0	0	3
Red Foxes	1,335 (SI)	2,047 (I)	1,923 (I)	1	0	1	55
Raccoons	79,314(SD)	143,589(I)	129,630 (I)	3	1	2	5,546
Skunks	92 (S)	259 (I)	328 (I)	0	5	0	0
Opossums	867 (S)	3,007 (I)	6,214 (I)	0	0	0	1,581
Beavers	1,895 (S)	2,695 (SI)	3,095 (I)	0	0	0	754
Muskrats	27,563(SD)	52,553 (I)	48,986(D)	0	0	0	NA

¹ Numbers may be underestimates of total sport take because not all pelts are taken to fur buyers.

² Population trend estimates provided by IDNR (B. Plowman, Furbearer Biologist, pers. comm.), S = Stable, SD = Slight decrease, SI = Slight Increase, D = Decreasing, I = Increasing.

³ Animals taken for MDM by entities other than WS..

Rodents and Insectivores

Native Species: Rodents (mice, voles, etc.) and insectivores (shrews and moles) are taken by WS during wildlife hazard management, assessment, and monitoring at airports and airbases, since these species serve as attractants to birds such as vultures and hawks, which create direct hazards to public safety and aviation (USDA 2002). Additionally, these species may be taken in orchards and other cultivated areas to reduce damage to agricultural resources, such as apple trees and in near parks, residences, and other structures to protect human health and safety, property, or natural resources.

Vole species which may be the target of WS activities at airports and other locations include meadow vole, pine vole, and red-backed vole/mouse. Mice which may be the target of WS activities at airports and other locations include house mouse, deer mouse, white-footed mouse, woodland jumping mouse, and meadow jumping mouse. Insectivores which may be the target of WS activities at airports and other locations include Eastern mole, star-nosed mole, and short-tailed shrew. The following species are very prolific: meadow voles (up to 17 litters annually, typically 4-5 young per litter), house mouse (6 litters, 4-5 young each), white-footed mouse (multiple litters, 5 young each), deer mice (3-4 litters, 4-6 young each), and short-tailed shrews (2-3 litters, 5-7 young each) (Godin 1977). The following species have 1-2 litters per year: pine vole (2-4 young per litter), meadow jumping mice (5-6 young each), woodland jumping mouse (5 young each), Eastern mole (2-5 young each), and star-nosed mole (3-7 young each) (Godin 1977).

These nongame species (except the house mouse a non-native species) are managed in Indiana by the Division of Fish and Wildlife's Endangered and Nongame Species Program, and their take is conducted pursuant to Depredation and Scientific Collection Permits issued by the Endangered and Nongame Species Program. Permits identify the species which can be taken at specific sites. Method of take for these species by WS would include trapping, use of chemical products such as ZnP, and other legal methods (Appendix B). Removal of these species by WS would be done at specific sites (e.g., airports, orchards, etc.). Impacts of these activities to rodent and insectivore populations would be minimal due to the species' relatively high reproductive rates and because rodent/insectivore damage management recommended and conducted by WS would be at a limited number of specific local sites, via legal methods, and pursuant to permits.

Non-native Species: Norway Rats, black (roof) rats, and house mice not native to North America and were accidentally released into this country. In the wild, the impact of these species is seen may many as entirely detrimental (Burt and Grossenheider 1980). These species eat anything edible and may prey on eggs or offspring of native species and compete with native species for resources. Executive Order 13112 – Invasive Species directs Federal agencies to use their programs and authorities to prevent the spread of or to control populations of invasive species that cause economic or environmental harm, or harm to human health. Although removal of these species up to and including extirpation could be seen as desirable, for reasons described above for native rodents and insectivores, WS is unlikely to ever have this level of impact on overall populations of these species in Indiana.

Based on the above information and WS limited lethal take of rodents and insectivores in Indiana, WS should have minimal effects on local or statewide rodent populations.

Feral Swine

Feral swine are a non-native species, and are primarily found in the southern portions of the state. IDNR currently considers feral swine as an invasive species and does not track harvest or population densities of feral swine. Although WS has not received any requests to provide assistance with feral swine, biologists with WS and the IDNR are reporting an increase in reports of feral swine sightings and activity, and are concerned that feral swine numbers in Indiana may be increasing. Management of conflicts associated with feral swine are being addressed in this EA so that WS may immediately assist IDNR in minimizing the impacts of this non-native species on people and ecosystems in the state. WS could be requested to assist with the removal of feral swine either for the reduction of damage cause by feral swine to agricultural and natural resources, for reduction of risks to human health and safety, or for the purposed of disease surveillance and management. Based upon current and anticipated increases in future work, it is anticipated that not more than 200 feral swine would be killed annually by WS in Indiana. Feral swine often have negative impacts on the environment. Therefore, these animals are considered by many wildlife biologists to be an undesirable component of North American wild and native ecosystems. Any reduction in feral swine populations could be considered a beneficial impact to the environment. Executive Order 13112 – Invasive Species directs Federal agencies to use their programs and authorities to prevent the spread of or to control populations of invasive species that cause economic or environmental harm, or harm to human health. Although a reduction in the number of feral swine may be desirable, the proposed level of feral swine control is unlikely to result in more than a temporary reduction of feral swine numbers at specific sites.

Other Target Species

Target species, in addition to those analyzed above, have been killed in small numbers by WS during the past year and have included no more than 20 individuals of a given species (Table 4-1). Other species that could be killed during MDM may include but are not necessarily limited to the species listed in Section 1.2. None of these species are expected to be taken by WS MDM at any level that would adversely affect populations. WS would not conduct MDM involving state listed threatened or endangered or sensitive species without situation specific consultation with IDNR.

Based upon an anticipated increase in future requests for WS assistance, WS predicts that no more than 20 individuals of these mammal species would be lethally removed annually under the proposed action. Feral cats and dogs would be trapped and delivered to animal control officers or shelters. Given IDNR oversight (state protected species), and WS limited lethal take, none of the above mentioned mammal species are expected to be taken by WS MDM at any level that would adversely affect overall mammal populations on a local or statewide basis.

4.1.1.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would not take any target mammal species because no lethal methods would be used. Although WS lethal take of mammals would not occur, as with Alternative 1, it is likely that without WS conducting some level of lethal MDM activities for these species, private MDM efforts would increase. Cumulative impacts on target species populations would be variable depending upon actions taken by affected landowners/resource managers and the level training and experience of the individuals conducting the MDM. Some individuals experiencing damage may take illegal or unsafe action against the problem species either unintentionally due to lack of training, or deliberately out of frustration of continued damage. In these instances, more target species may be taken than with a professional WDM program (Alternatives 2). Ready access to WS assistance with non-lethal MDM may decrease private efforts to use lethal techniques. Therefore, take of target species may be less than anticipated with Alternatives 1 and 4. Overall impacts on target species populations would be similar to or slightly higher than Alternative 2 depending upon the extent to which resource managers use the assistance provided by WS. However, for the reasons presented in the population effects analysis in section 4.1.1.2, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

4.1.1.4 Alternative 4: No Federal WS Mammal Damage Management

Under this alternative, WS would have no impact on target mammal populations in the State. Private efforts to reduce or prevent depredations would likely increase. As with Alternatives 1 and 3, cumulative impacts on target species populations would be variable depending upon actions taken by affected landowners/resource managers and the level training and experience of the individuals conducting the MDM. Impacts on target species are likely to be similar to or slightly higher than Alternative 2. Because resource owners/managers would not have access to WS technical assistance or, at least, operational assistance with non-lethal techniques, impacts may be greater than alternatives 1 and 3. For the same reasons shown in the population effects analysis in section 4.1.1.2, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

4.1.2 Effects on Other Wildlife Species, including T&E Species

4.1.2.1 Alternative 1: Technical Assistance Only

Alternative 1 would not allow any WS direct operational MDM in Indiana; therefore WS would not take any non-target species under this alternative. The IDNR or other natural resource management entities may have to allocate staff time and resources for projects to protect threatened, endangered and rare birds because WS could no longer assist with these programs. Only technical assistance or self-help information would be provided. Although technical support might lead to more selective use of control methods by private parties than that which might occur under Alternative 4, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods, leading to greater risks to non-target wildlife than under the proposed action. It is hypothetically possible that, similar to Alternative 3 and 4, frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown risks to non-target species populations. Hazards to raptors, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Effects on wetlands - WS would have no direct impact on wetlands. WS would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical

assistance. Overall impacts should be less than Alternative 4 when WS technical advice is requested and followed.

Effects on T&E species – WS will not have any direct impact on T&E species. Risks to T&E species from increased private efforts to address damage management problems will vary depending upon the training and level of experience of the individual conducting the MDM. As stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons which may increase risks to species like the bald eagle and peregrine falcon. Risks to T&E species may be lower with this Alternative than with Alternative 4 because WS could advise individuals as to the potential presence of state and federally listed species in their area and could facilitate consultation with the appropriate agency.

4.1.2.2 Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

Effects on Non-target (non-T&E) Species. Direct impacts on nontarget species could occur if WS program personnel were to inadvertently kill, injure, or harass animals that are not target species. In general, these impacts result from the use of methods that are not completely selective for target species. Non-target species are usually not affected by WS's non-lethal management methods, except for the occasional scaring from harassment devices. In these cases, affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action.

There has been no lethal take of non-target species by WS while conducting MDM activities in Indiana. WS take of non-target species during MDM activities is expected to be extremely low to non-existent. If take of nontarget species would occur, these occurrences are rare and should not affect the overall populations of any species under the current program.

WS personnel are experienced and trained in wildlife identification, and to select the most appropriate methods for taking targeted animals and excluding nontarget species. Shooting is virtually 100% selective for the target species; therefore no adverse impacts are anticipated from use of this method. WS personnel use animal lures and set traps and snares in locations that are conducive to capturing target animals while minimizing potential impacts to nontarget species. Any non-target species captured would be subsequently released on site unless it is determined by the WS Specialist that the animal will not survive.

WS' SOPs would require compliance with pesticide label directions and use restrictions, and establish training requirements for all employees applying pesticides as built-in measures to assure that use of registered chemical products does not result in significant adverse effects on non-target species populations. Risk Assessments conducted on the WS program concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997 Revised). Chemical pesticides that have come into use since the Risk Assessment was completed have undergone considerable environmental review through EPA and State registration processes, which means they have been found to present no unreasonable risk to the environment or human health and safety when used according to label directions. Standard operating procedures designed and implemented to avoid adverse effects on non-target species are described in Chapter 3.

Effects on wetlands – Under this alternative, Beaver dams could be breached or removed by hand or with explosives for the purpose of returning streams, channels, dikes, culverts, and irrigation canals to their original drainage pattern. Beaver dams are removed according to Section 404 of the Clean Water Act (CWA). WS breaches/removes most beaver dams because of flooding in areas such as yards, parks, roads, railroads, timberlands, croplands, pastures, and other types of

property or resources that were not previously flooded. Recently flooded sites do not possess wetland characteristics, and wildlife habitat values are not the same as established wetlands (Appendix D). Dam removal in these situations will be restoring the status quo for these sites and will likely be beneficial to most resident plants and animals. In the relatively rare instances when WS removes dams from an area where wetland communities have developed, WS uses the procedures described in Appendix C to assure compliance with pertinent laws and regulations. For these reasons WS beaver dam removal/breaching activities should have minimal impact on wetlands.

Effects on T&E species - WS MDM activities in Indiana would not adversely affect any Federal or State listed T&E species, including those listed in Appendix C. This determination is based, in part, on the conclusions made by the USFWS during their 1992 programmatic consultation on the National WS program and subsequent Biological Opinion (USDA 1997 Revised). Indiana WS will adhere to all applicable Reasonable and Prudent Measures and Terms and Conditions from the 1992 Biological Opinion. WS will also consult with the State and Federal Endangered Species programs prior to the initiation of damage management activities in new areas.

4.1.2.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

WS efforts to protect rare, threatened or endangered species would not be as effective as the preferred alternative because WS would be unable to access lethal techniques if non-lethal techniques are ineffective. Lethal efforts to protect these species would have to be conducted by other natural resource management entities (e.g. IDNR). Under this alternative, WS take of non-target animals would be less than that of the proposed action because no lethal control actions would be taken by WS. Non-target species are usually not affected by WS's non-lethal management methods, except for the occasional scaring from harassment devices. In these cases, affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action. Capture and release (e.g., for disease monitoring) and capture and relocate would be allowed under this alternative. There is the extremely remote chance that the capture devices could result in the death of a nontarget animal. However, given that these devices would be applied with provisions to keep the target animal alive, the risks to nontarget species are very low and would not result in adverse impacts on nontarget species populations.

If mammal damage problems were not effectively resolved by non-lethal control methods, members of the public may resort to other means of lethal control such as the use of shooting or the use of pesticides. This could result in less experienced persons implementing control methods and could lead to greater risks to non-target wildlife than the proposed action. For example, shooting by persons not proficient at mammal identification could lead to killing of non-target mammals. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including T&E species. Hazards to raptors, including bald eagles and falcons, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Effects on wetlands - Beaver created impoundments could be breached/removed by hand, with machinery, or with explosives by WS for the purpose of returning streams, channels, ditches, and irrigation canals to the original drainage under this alternative. Overall impacts would be similar to Alternative 2.

Effects on T&E species - WS will not have any direct impact on T&E species. Risks to T&E species from increased private efforts to address damage management problems will vary depending upon the training and level of experience of the individual conducting the MDM. As

stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons which may increase risks to species like the bald eagle and peregrine falcon. Risks to T&E species may be lower with this Alternative than with Alternative 4 because people would have ready access to assistance with non-lethal MDM techniques. WS could advise individuals as to the potential presence of state and federally listed species in their area.

4.1.2.4 Alternative 4: No Federal WS Mammal Damage Management

Alternative 4 would not allow any WS MDM in the State; therefore WS would not take any non-target species under this alternative. The IDNR or other natural resource management entities may have to allocate staff time and resources for projects to protect threatened, endangered and rare birds because WS could no longer assist with these programs. Private efforts to reduce or prevent depredations could increase which could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than under the proposed action. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could impact local non-target species populations, including some T&E species. Hazards to raptors, including bald eagles, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Effects on wetlands - WS would have no impact on wetlands. Under this alternative, beaver dam breaching and removal needs would be met by private, state, or local government entities. Some beaver impounded areas that WS would advise against draining might be drained under private or local government management, which could have adverse effects on wetland habitats in limited circumstances.

Effects on T&E species – WS will not have any direct impact on T&E species. Risks to T&E species from increased private efforts to address damage management problems will vary depending upon the training and level of experience of the individual conducting the MDM. As stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons which may increase risks to species like the bald eagle and peregrine falcon. Risks to T&E species may be higher with this Alternative than with the other alternatives because WS would not have any opportunity to provide advice or assistance with the safe and effective use of MDM techniques or have the opportunity to advise individuals regarding the presence of T&E species.

4.1.3 Effects on Human Health and Safety

4.1.3.1 Safety and Efficacy of Chemical Control Methods

Alternative 1: Technical Assistance Only

Alternative 1 would not allow any direct operational MDM assistance by WS. Concerns about human health risks from WS's use of chemical MDM methods would be alleviated because no such use would occur. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and leading to a greater risk than Alternative 2. However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from chemical MDM methods use should be less than under Alternative 4.

Hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate mammal damage could lead to illegal use of certain toxicants that could pose secondary poisoning hazards to pets. Some chemicals that could be used illegally

could present greater risks of adverse effects on humans than those used under the Proposed Action alternative.

Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

Toxicants. The toxicants that could be used by WS under this alternative are described in detail in Appendix B and include ZnP, gas cartridges, and anticoagulant rodenticides. Gas cartridges and ZnP are used in WS MDM programs in Indiana by WS personnel who are certified pesticide applicators, in accordance with label restrictions in a manner defined by application guidelines on the label. Based on a thorough Risk Assessment, APHIS concluded that, when WS Program chemical methods, including those referenced above, are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997 Revised). Chemical pesticides that have come into use since the Risk Assessment was completed have undergone considerable environmental review through EPA and State registration processes, which means they have been found to present no unreasonable risk to the environment or human health and safety when used according to label directions. Therefore, MDM programs in Indiana where such chemicals are used are not expected to adversely affect public safety. There have been no observed symptoms of chronic poisoning due to ZnP exposure in humans.

Other MDM Chemicals. Non-lethal MDM chemicals that might be used or recommended by WS would include repellents such as Hinder, Deer Away and others that are registered with the OISC. Such chemicals must undergo rigorous testing and research to prove safety, and low environmental risks before they would be registered by the EPA or Food and Drug Administration (FDA). Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in SOP that would assure that use of registered chemical products would avoid significant adverse effects on human health.

Drugs used in capturing, sedating, handling, and euthanizing wildlife for wildlife management purposes include ketamine hydrochloride, a mixture of tiletamine and zolazepam (Telazol), xylazine (Rompun), sodium pentobarbital, potassium chloride, Yohimbine, antibiotics, and others. WS would adhere to all applicable requirements of the Animal Medicinal Drug Use Clarification Act (AMDUCA) to prevent any significant adverse impacts on human health with regard to this issue. Standard operating procedures for the use of drugs would include:

- All drugs used in capturing and handling wildlife would be under the direction and authority of state veterinary authorities, either directly or through procedures agreed upon between those authorities and WS. As determined on a state-level basis by these veterinary authorities (as allowed by AMDUCA), wildlife hazard management programs may choose to avoid capture and handling activities that utilize immobilizing drugs within a specified number of days prior to the hunting or trapping season for the target species to avoid release of animals that may be consumed by hunters prior to the end of established withdrawal periods for the particular drugs used. Animals that have been drugged and released would be ear tagged or otherwise marked to alert hunters and trappers that they should contact state officials before consuming the animal.
- Most drug administration would be scheduled to occur well before state controlled hunting/trapping seasons which would give the drug time to completely metabolize out of the animals' systems before they might be taken and consumed by humans. In some instances, animals collected for control purposes would be euthanized when they are captured within a certain specified time period prior to the legal hunting or trapping

season to avoid the chance that they would be consumed as food while still potentially having immobilizing drugs in their systems.

- Activities involving the handling and administering drugs, drugs selected for use, animal marking systems, and the fate of any animals that must receive drugs at times during or close to scheduled hunting seasons would be coordinated with the IDNR.

By following these procedures, the proposed action would avoid any significant impacts on human health with regard to this issue.

Alternative 3: Non-lethal Mammal Damage Management Only by WS

Alternative 3 would not allow for any lethal MDM by WS in Indiana. WS could only implement non-lethal methods such as harassment and exclusion devices and materials. Non-lethal methods could, however, include use and recommendation of repellents and could use the use of capture and handling drugs for capture and release projects. Impacts from WS use of these chemicals would be similar to those described under the proposed action.

Excessive cost or ineffectiveness of non-lethal techniques could result in some entities rejecting WS's assistance and resorting to other means of MDM. Risks associated with non-WS use of toxicants will vary depending upon the training and experience of the individuals conducting the MDM. Such means could include illegal pesticide uses. Hazards to humans could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those used under the proposed alternative. Overall risks to human health and safety from this alternative are likely to be equal to or greater than Alternative 2.

Alternative 4: No Federal WS Mammal Damage Management

Alternative 4 would not allow any WS MDM in Indiana. Concerns about human health risks from WS's use of chemical MDM methods would be alleviated because no such use would occur. Private efforts to reduce or prevent damage would be expected to increase. Risks to human health and safety from chemical MDM methods will be variable depending upon the training and experience of the individual conducting the MDM. Hazards to humans and pets could be greater under this alternative if other chemicals that are less selective or that cause secondary poisoning are used or if chemicals are used improperly by inexperienced personnel. It is hypothetically possible that frustration caused by the inability to alleviate mammal damage could lead to illegal use of certain toxicants that could pose secondary poisoning hazards to pets. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those used under the current program alternative.

4.1.3.2 Impacts on Human Safety of Non-chemical MDM Methods

Alternative 1: Technical Assistance Only

Under this alternative, WS would not engage in direct operational use of any non-chemical MDM methods. Risks to human safety from WS's use of firearms, traps, snares and pyrotechnics would not exist because WS would not be conducting direct control activities. However, WS would provide technical advice to those persons requesting assistance. Landowners/resource managers could use information provided by WS or implement damage reduction methods without WS technical assistance. Hazards to humans and property could be greater under this alternative if personnel conducting MDM activities using non-chemical methods are poorly or improperly trained. Negative impacts to public safety resulting from the improper use of control methods should be less than Alternative 4 when WS technical advice is followed.

Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

Non-chemical MDM methods that might raise safety concerns include shooting with firearms, use of traps and snares, and harassment with pyrotechnics. All WS personnel are trained in the safe and effective use of MDM techniques. The Indiana WS program has had no accidents involving the use of any of its non-chemical MDM techniques including firearms, pyrotechnics, traps, snares, or explosives in which any person was harmed. A formal risk assessment of WS's operational management methods found that when used in accordance with all applicable laws, regulations, policy and directives, risks to human safety from the proposed methods were low (USDA 1997 Revised, Appendix P). Therefore, no adverse effects on human safety from WS's use of these methods is expected. Standard operating procedures designed and implemented to avoid adverse effects on public and pet health and safety are described in Chapter 3. Therefore, no adverse effects on human safety from WS's use of these methods is expected.

WS may occasionally use binary explosives to breach or remove beaver dams. WS personnel responsible for use of explosives are required to complete in-depth training and must demonstrate competence and safety with use of explosives. Employees adhere to WS policies as well as regulations from the Bureau of Alcohol, Tobacco, and Firearms, the Occupational Safety and Health Administration, and the U.S. Department of Transportation with regards to explosives use, storage, safety, and transportation. WS uses binary explosives which require the mixing of two components before the explosive can be detonated. Use of binary explosives reduces the hazard of accidental detonation during storage and transportation. Storage and transportation of mixed binary explosives is not allowed. When explosives are being used by WS, warning signs are posted to restrict public entry. When beaver dams are near roads or highways, police or other road officials are used to help stop traffic and restrict public entry. MODOT crews would assist with traffic concerns to ensure public safety when WS removes beaver dams with explosives. Therefore, no adverse effects to public safety are expected from the use of explosives by WS under any alternative.

Shooting and trapping are methods used by WS which pose minimal or no threat to pets and/or public health and safety. All firearm safety precautions are followed by WS when conducting MDM and WS complies with all laws and regulations governing the lawful use of firearms. Shooting is virtually 100% selective for target species and may be used in conjunction with spotlights. WS may use firearms to humanely euthanize animals caught in live traps. WS traps are strategically placed to minimize exposure to the public and pets. Appropriate signs are posted on all properties where traps are set to alert the public of trap presence. Body-grip (e.g., Conibear-type) traps used for beaver are restricted to water sets which further reduce threats to public and pet health and safety.

Firearms and firearm misuse are a cause of concern because of issues relating to public safety and accidental injury or death. To ensure safe use of firearms, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees who use firearms as a condition of employment must comply with all applicable Federal State and local regulations including the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, non-chemical MDM methods that might raise safety concerns include shooting with firearms when used as a harassment technique, cage traps, and harassment with pyrotechnics. Risks associated with firearms used as a harassment technique are as discussed for firearms use in Alternative 2. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. A formal risk assessment of WS operational management methods including the non-lethal techniques that would be available under this alternative, found that risks to human safety were low (USDA 1997 Revised, Appendix P). Therefore, no adverse effects on human safety from WS's use of these methods is expected.

Some resource owners/managers may not feel that non-lethal techniques are adequate to resolve their wildlife conflict and may use lethal MDM methods without WS assistance. Risks to human safety from these actions will depend on the method selected and the experience and training of the individual using the technique.

Alternative 4: No Federal WS Mammal Damage Management

Alternative 4 would not allow any WS MDM in the State. Concerns about human health risks from WS's use of non-chemical MDM methods would be alleviated because no such use would occur. However, private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative. Non-WS personnel would be able to use pyrotechnics, traps, snares or firearms in MDM programs and this activity would likely occur to a greater extent in the absence of WS assistance. Hazards to humans and property could be greater under this alternative if personnel conducting MDM activities using non-chemical methods are poorly or improperly trained.

4.1.3.3 Effects on Human Health and Safety from Mammals

Alternative 1: Technical Assistance Only

With WS technical assistance but no direct management, entities requesting MDM assistance for human health concerns would either take no action, which means the risk of human health problems would likely continue or increase in each situation as mammal numbers are maintained or increased, or implement WS recommendations for non-lethal and lethal control methods. Potential impacts would be variable depending upon the training and experience of the individuals conducting the MDM. Individuals or entities that implement may lack the experience necessary to efficiently and effectively conduct an effective MDM program and risks could continue or increase. Therefore, the odds of successfully reducing wildlife risks to human health and safety may be similar to or lower than Alternative 2. The likelihood that individual efforts would reduce mammal conflicts would be higher under this alternative than Alternative 4 if people request and use WS technical assistance recommendations.

Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

An Integrated MDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing human health and safety risks associated with the mammals addressed in this EA. Under this alternative, all legal MDM methods could possibly be implemented and recommended by WS. Efficacy of any given MDM method will vary depending on site specific conditions. Access to the full range of MDM methods results in the greatest possibility of alleviating risks to human health and safety by allowing WS specialists to pick the methods best suited to the particular situation.

In most cases, it is difficult to conclusively prove that mammals were responsible for transmission of individual human cases or outbreaks of mammal-borne diseases. However, the limited records of disease occurrence in Indiana does not necessarily mean absence of risk but may only mean lack of reliable research in this area. There are limited studies available on the occurrence and transmission of zoonotic diseases in wild mammals. Study of this issue is complicated by the fact that some disease-causing agents associated with wildlife, may also be contracted from other sources. WS works with cooperators on a case-by-case basis to assess the nature and magnitude of the wildlife conflict including providing information on the limitations about what we know regarding health risks associated with wild mammals. In most cases, the risk of contracting a disease from wild mammals is relatively low. It is the choice of the individual cooperator to tolerate the potential health risks or to seek to reduce those risks. Certain requesters of MDM service may consider even a low level of risk to be unacceptable. Many property owners/managers wish to eliminate risks *before* someone actually gets sick because of conditions at their site. In such cases, MDM, either by lethal or non-lethal means, would, if successful, reduce the risk of mammal-borne disease transmission at the site for which MDM is requested.

In some situations the implementation of non-lethal controls such as netting barriers and harassment could actually increase the risk of human health problems at other sites by causing the mammals to move to other sites not previously affected. In such cases, lethal removal of the mammals may actually be the best alternative from the standpoint of overall human health concerns in the local area. If WS is providing direct operational assistance in relocating mammals, coordination with local authorities would be conducted to assure they do not reestablish in other undesirable locations.

Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods in providing assistance with mammal damage problems. Non-lethal methods may not be effective at or suitable for all situations. The efficacy of some techniques may be limited by habituation (the ability of an animal to become accustomed to and not respond to an otherwise frightening sight or sound). Other techniques like fencing may not be suitable because of zoning, visual impacts on the site, or because they may adversely impact other non-injurious species. In some situations the implementation of non-lethal controls such as netting barriers and harassment could actually increase the risk of human health problems at other sites by causing the mammals to move to other sites not previously affected. However, when WS is providing direct operational assistance in relocating mammals, coordination with local authorities would be conducted to minimize the risk of problem animals relocating to other undesirable areas.

Alternative 4: No Federal WS Mammal Damage Management

With no WS assistance, cooperators would be responsible for developing and implementing their own MDM program. Success of cooperator efforts to reduce or prevent risks to human health and safety from wildlife will depend on the training and experience of the individual conducting the MDM. If less experienced persons attempt to implement control methods, risks of not reducing mammal hazards could be greater than under the proposed action. For example, in some situations the implementation of non-lethal controls such as netting barriers and harassment could actually increase the risk of human health problems at other sites by causing the mammals to move to other sites not previously affected.

4.1.4 Impacts to Stakeholders, including Aesthetics

4.1.4.1 Effects on Human Affectionate Bonds with Individual Mammals and on Aesthetic Values of Wild Mammal Species

Alternative 1: Technical Assistance Only

Under this alternative, WS would not conduct any direct operational MDM, but would still provide technical assistance or self-help advice to persons requesting assistance with mammal damage. Those who oppose direct operational assistance in wildlife damage management by the government, but favor government technical assistance, would favor this alternative. Persons who have developed affectionate bonds with individual wild mammals would not be affected by WS's activities under this alternative because this individual animal would not be killed by WS. However, other private entities would likely conduct MDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the Proposed Action alternative.

Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

Those who routinely view or feed individual animals would likely be disturbed by removal of such mammals under the current program. WS is aware of such concerns and takes these concerns into consideration when developing site specific management plans. WS may be able to mitigate such concerns by leaving certain animals that have been identified by interested individuals.

Some members of the public have expressed opposition to the killing of any mammals during MDM activities. Under this Proposed Action alternative, some lethal control of mammals would occur and these persons would be opposed. However, many persons who voice opposition have no direct connection or opportunity to view or enjoy the particular mammals that would be killed by WS's lethal control activities. Lethal control actions would generally be restricted to local sites and to small, unsubstantial percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would, therefore, continue to remain available for viewing by persons with that interest.

Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would not conduct any lethal MDM, but may conduct harassment of mammals that are causing damage. Some people who oppose lethal control of wildlife by the government, but are tolerant of government involvement in non-lethal wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild mammals would not be affected by the death of individual mammals under this alternative, but might oppose dispersal or translocation of certain mammals. WS may be able to mitigate such concerns by leaving certain animals that have been identified by interested individuals. Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct MDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the proposed action alternative.

Alternative 4: No Federal WS Mammal Damage Management

Under this alternative, WS would not conduct any lethal removal of mammals nor would the program conduct any harassment of mammals. Those in opposition of any government involvement in wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild mammals would not be affected by WS's

activities under this alternative. However, other private entities would likely conduct MDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the proposed action alternative.

4.1.4.2 Effects on Aesthetic Values of Property Damaged by Mammals

Alternative 1: Technical Assistance Only

Wildlife Services would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. When WS technical advice is requested and followed, impacts on those persons adversely affected by mammal damage should be less than Alternative 4. However, some resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, MDM could be take longer to execute and may be less effective under this alternative than the proposed action alternative depending upon the skills and abilities of the person implementing MDM control methods.

Relocation of mammals through harassment, barriers, or habitat alteration can sometimes result in the mammals causing the same problems at the new location. If WS has only provided technical assistance to local residents or municipal authorities, coordination with local authorities to monitor the mammal's movements to assure the mammals do not reestablish in other undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

Alternative 2: Integrated Mammal Damage Management Program (Proposed Action/No Action)

Damage to property would be expected to decrease under this alternative since all available damage management methods and strategies would be available for WS use and consideration.

Relocation or dispersal of mammals by harassment can sometimes result in the mammals causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such mammals, coordination with local authorities would be conducted to assure they do not re-establish in other undesirable locations.

Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods in providing assistance with mammal damage problems. While this may improve the use of non-lethal methods over that which might be expected under Alternative 4, the efficacy of non-lethal methods can be quite variable. If non-lethal methods were ineffective at reducing damage, WS would not be able to provide any other type of assistance. In these situations, mammal damage would likely continue to increase unless resource owners implemented an effective MDM program in the absence of WS. Resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, MDM could be take longer to execute and may be less effective under this alternative than the proposed action alternative depending upon the skills and abilities of the person implementing MDM control methods.

Assuming property owners would choose to allow and pay for the implementation of non-lethal methods, this alternative could result in mammals relocating to other sites where they could cause or aggravate similar problems for other property owners. Thus, this alternative could result in more property owners experiencing adverse effects on the aesthetic values of their properties than the Proposed Action alternative.

Relocation or dispersal of mammals by harassment can sometimes result in the mammals causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such mammals, coordination with local authorities would be conducted to assure they do not re-establish in other undesirable locations.

Alternative 4: No Federal WS Mammal Damage Management

Mammal damage would likely continue to increase unless resource owners implemented an effective MDM program in the absence of WS. Resource owners could implement their own damage reduction program without WS assistance. Resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, MDM could take longer to execute and may be less effective under this alternative than the proposed action alternative depending upon the skills and abilities of the person implementing MDM control methods.

Relocation of mammals through harassment, barriers, or habitat alteration can sometimes result in the mammals causing the same problems at the new location. Coordination of relocation and dispersal activities by local residents with local authorities to monitor the mammal's movements to assure the mammals do not re-establish in other undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

4.1.5 Humaneness and Animal Welfare Concerns of Methods Used

4.1.5.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would provide self-help advice only. Lethal methods viewed as inhumane by some persons would not be used by WS. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. Many of the methods considered inhumane by some individuals and groups might still be used by resource owners. Overall impacts should be less than Alternative 4 when WS technical advice is requested and followed.

4.1.5.2 Alternative 2: Implement an Integrated Mammal Damage Management Program (Proposed Action/No Action)

MDM methods viewed by some persons as inhumane would be employed by WS under this alternative. These methods would include shooting, trapping, toxicants/chemicals, and snares. Despite SOPs and state trapping regulations designed to maximize humaneness, the perceived stress and trauma associated with being held in a trap or snare until the WS employee arrives at the capture site to dispatch or release the animal, is unacceptable to some persons. Although Indiana WS would only use drowning sets if all other capture and removal methods had failed or are unsuitable for the site, some individuals will find even this rare (likely <1 site per year) use objectionable. Other MDM methods used to take target animals including shooting and body-gripping traps (i.e., Conibear) result in a relatively humane death because the animals die instantly or within seconds to a few minutes. These methods however, are also considered inhumane by some individuals.

WS uses EPA registered and approved pesticides, such as ZnP and gas cartridges to manage damage caused by some mammals in Indiana. Some individuals consider the use of such chemicals to be inhumane. WS personnel are experienced, professional and humane in their use of management methods. Under this alternative, mammals would be killed by experienced WS personnel using the best and most appropriate method(s) available. Some people may perceive these methods as inhumane because they oppose all lethal methods of damage management.

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some MDM methods are used in situations where non-lethal damage management methods are not practical or effective.

4.1.5.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, lethal methods, viewed as inhumane by some persons, would not be used by WS. Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct MDM activities similar to those that would no longer be conducted by WS, resulting in impacts similar to the proposed action alternative.

4.1.5.4 Alternative 4: No Federal WS Mammal Damage Management

Under this alternative, lethal methods, viewed as inhumane by some persons, would not be used by WS. Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct MDM activities similar to those that would no longer be conducted by WS, resulting in impacts similar to the proposed action alternative.

4.2 CUMULATIVE IMPACTS

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under Alternatives 1, 2 and 3, WS would, to varying extents, address damage associated with mammals in a number of situations throughout the State. The WS MDM program would be the primary federal program with MDM responsibilities; however, some state and local government agencies may conduct MDM activities in Indiana as well. Through ongoing coordination with these agencies, WS is aware of such MDM activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area, but may conduct MDM activities at adjacent sites within the same time frame. In addition, commercial pest control companies may conduct MDM activities in the same area. IDNR keeps records of all animals taken for MDM and this information is presented in the cumulative impact analysis section for target species. The potential cumulative impacts analyzed below could occur either as a result of WS MDM program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Cumulative Impacts on Wildlife Populations

As shown in Section 4.1.1, MDM methods used or recommended by the WS program in Indiana will have no cumulative adverse effects on target and non-target wildlife populations. WS limited lethal take of target mammal species is anticipated to have minimal impacts on target mammal populations in Indiana. When control actions are implemented by WS the potential lethal take of non-target wildlife species is expected to be minimal and will not adversely affect populations of these species.

Cumulative Impact Potential from Chemical Components

MDM programs which include the use of pesticides as a lethal population management component may have the greatest potential for cumulative impacts on the environment as such impacts relate to deposit of chemical residues in the physical environment and environmental toxicosis. The toxicants ZnP, and gas cartridges are the chemicals most frequently used or recommended by the Indiana WS MDM program. These chemicals have been evaluated for possible residual effects which might occur from buildup of the chemicals in soil, water, or other environmental sites in detailed risk assessments in the WS programmatic FEIS (USDA 1997 Revised). Based on use patterns, the chemical and physical characteristics of mammal control toxicants, and factors related to the environmental fate of these pesticides, no cumulative impacts are expected from the lethal chemical components used or recommended by the WS MDM program in Indiana (USDA 1997 Revised).

Non-lethal chemicals, such as repellents, may also be used or recommended by the WS MDM program in Indiana. Characteristics of these chemicals and use patterns indicate that no significant cumulative impacts related to environmental fate are expected from their use in WS MDM programs in Indiana.

Cumulative Impact Potential from Non-chemical Components

Non-chemical methods used by WS MDM program may include exclusion through use of various barriers, live trapping and relocation or euthanasia of mammals, harassment of mammals, trapping, snaring, and shooting. Based on analysis in Sections 4.1.1 and 4.1.2, no cumulative impacts from WS use of these methods to take animals are expected especially given that take would be authorized and/or permitted with IDNR oversight.

SUMMARY

No significant cumulative environmental impacts are expected from any of the 4 alternatives. Under the Proposed Action, the lethal removal of mammals by WS would not have significant impacts on overall target mammal populations in Indiana, but some short-term local reductions may occur. No risk to public safety is expected when WS's services are provided and accepted by requesting individuals in Alternatives 2 since only trained and experienced wildlife biologists/specialists would conduct and recommend MDM activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations in Alternatives 1, 2 and 3 conduct their own MDM activities, and when no WS assistance is provided in Alternative 4. In all 4 Alternatives, however, the increase in risk would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS's participation in MDM activities on public and private lands within the state of Indiana, the analysis in this EA indicates that WS Integrated MDM program will not result in significant cumulative adverse impacts on the quality of the human environment. Table 4-3 summarizes the expected impact of each of the alternatives on each of the issues.

Table 4-4. Summary of Potential Impacts.

Issue	Alternative 1 Technical Assistance Only	Alternative 2 Integrated Mammal Damage Management Program (Proposed Action/No Action)	Alternative 3 Non-lethal MDM Only by WS	Alternative 4 No Federal WS MDM Program
1. Target Mammal Species Effects	No effect by WS. Low effect - reductions in local target mammal numbers by non-WS personnel variable but likely would not significantly affect local or state populations.	Low effect - reductions in local target mammal numbers; would not significantly affect local or state populations	No effect by WS. Low effect - reductions in local target mammal numbers by non-WS personnel variable but likely would not significantly affect local or state populations.	No effect by WS. Low effect - reductions in local target mammal numbers by non-WS personnel variable but likely would not significantly affect local or state populations.
2. Effects on Other Wildlife Species, Including T&E Species	No effect by WS. Impacts by non-WS personnel would be variable. WS would not provide operational assistance with T&E species protection	Low effect - methods used by WS would be highly selective with very little risk to non-target species. WS would provide operational assistance with T&E species protection	Low effect - methods used by WS would be highly selective with very little risk to non-target species. WS only able to provide limited operational assistance with T&E species protection.	No effect by WS. Impacts by non-WS personnel would be variable. WS would not provide operational assistance with T&E species protection
3. Human Health and Safety Effects	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater risk of injuries and greater potential of not reducing mammal damage than under the proposed action.	The proposed action has the greatest potential of successfully reducing this risk. Low risk from methods used by WS.	Low risk of injuries from methods used by WS. WS less likely to resolve risks associated with animals than with Alt 2. Efforts by non-WS personnel to use lethal MDM techniques could result in less experienced persons implementing control methods, a greater risk of injuries and greater potential of not reducing mammal damage than under the proposed action.	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater risk of injuries and greater potential of not reducing mammal damage than under the proposed action.
4a. Aesthetic Values of Wild Mammal Species and Human Affectionate Bonds Effects	Low to moderate effect. Local mammal numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall state target mammal	Low to moderate effect at local levels; Some local populations may be reduced; WS ' MDM activities do not adversely affect overall state target mammal populations.	Low to moderate effect. Local mammal numbers in damage situations would remain high or possibly increase when non-lethal methods are ineffective unless non-WS personnel successfully implement lethal methods; no adverse affect on state target	Low to moderate effect. Local mammal numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall state target

	populations.		mammal populations.	mammal populations.
4b. Aesthetic Values of Property Damaged by Mammals	Mammal damage may not be reduced to acceptable levels; mammal may move to other sites which can create aesthetic damage problems at new sites.	Low effect - mammal damage problems most likely to be resolved without creating or moving problems elsewhere.	Mammal damage may not be reduced to acceptable levels; mammals may move to other sites which can create aesthetic damage problems at new sites.	High effect - mammal problems less likely to be resolved without WS involvement. Mammals may move to other sites which can create aesthetic damage problems at new sites
5. Humaneness and Animal Welfare Concerns of Methods Used	No effect by WS. Impacts by non-WS personnel would be variable.	Impact by WS low to moderate effect - methods viewed by some people as inhumane would be used by WS.	Impact by WS Lower effect than Alt. 2 since only non-lethal methods would be used by WS. Impacts by non-WS personnel would be variable.	No effect by WS. Impacts by non-WS personnel would be variable.

CHAPTER 5: LIST OF PREPARERS AND PERSONS CONSULTED

5.1 LIST OF PREPARERS/REVIEWERS

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5.2 LIST OF PERSONS CONSULTED

Jim Mitchell	Indiana Department of Natural Resources/White-tailed deer Biologist
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Scott Johnson	Indiana Department of Natural Resources/Threatened and Endangered Species Program
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APPENDIX A LITERATURE CITED

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APPENDIX B

MAMMAL DAMAGE MANAGEMENT METHODS

Resource owners and government agencies use a variety of techniques as part of integrated MDM programs. All lethal and non-lethal methods have limitations based on costs, logistics, practicality, or effectiveness. There are also regulatory constraints on the availability and use of some MDM techniques. Mammal damage management methods currently available to the Indiana WS program are described here. If other methods are proven effective and legal to use in Indiana, they could be incorporated into the Indiana WS program, pursuant to permits, other authorizations, agreements with landowners, NEPA compliance, and other laws, regulations, and policies. Details on State restrictions regarding the use of some WDM methods are provided in Section 1.8.4

NONLETHAL METHODS-NONCHEMICAL

Cultural Methods and Habitat Management includes the application of practices which seek to minimize exposure of the protected resource to damaging animals through processes other than exclusion. They may include animal husbandry practices such as employing guard dogs, herders, shed lambing, carcass removal, or pasture selection. Strategies may also include minimizing cover where damaging mammals might hide, manipulating the surrounding environment to deter animals from entering a protected area, removing trees along stream banks to discourage the presence of beavers, removal of trees from around buildings to reduce access by squirrels and raccoons, or planting lure crops on fringes of protected crops. Continual destruction of beaver dams and removal of dam construction materials on a daily basis will sometimes cause beavers to move to other locations, although this strategy can be far more expensive than removing beavers in conjunction with dam removal. Water control devices such as the 3-log drain (Roblee 1983), the T-culvert guard (Roblee 1987), wire mesh culvert (Roblee 1983), and the Clemson beaver pond leveler (Miller and Yarrow 1994) can sometimes be used to control the water in beaver ponds to desirable levels that do not cause damage. Use of these devices is very limited among private landowners, but is sometimes done by the IDNR in certain circumstances. Such methods have variable results and rarely provide acceptable levels of control unless used in an integrated program with other strategies. Some mammals which cause damage in urban environments are attracted to homes by the presence of garbage or pet food left outside and unprotected. Removal or sealing of garbage in tight trash receptacles, and elimination of all pet foods from outside areas can reduce the presence of unwanted mammals. If raccoons and opossums are a problem, making trash and garbage unavailable and removing all pet food from outside during nighttime hours can reduce their presence. If tree squirrels are damaging property or causing a nuisance, care in preventing them from obtaining bird seed left in bird feeders can often greatly reduce their presence. This may mean hanging bird feeders by thin wire from tree limbs, or constructing mounting poles which cannot be climbed by these animals.

Animal Behavior Modification. This refers to tactics that deter or repel damaging mammals and thus, reduce damage to the protected resource. These techniques are usually aimed at causing target animals to respond by fleeing from the site or remaining at a distance. They usually employ extreme noise or visual stimuli (e.g., flashing lights). Unfortunately many of these techniques are only effective for a short time before animals habituate (i.e., learn there is not a real threat; Conover 1982). Combining frightening stimuli and regularly changing the location, source and type of stimuli can extend the protective period of non-lethal methods. Using motion activated systems instead of systems which are activated on regular intervals may also extend the effective period for a frightening devices. Devices used to modify behavior in mammals include:

- Electronic guards (siren strobe-light devices)
- Propane exploders
- Pyrotechnics
- Laser lights
- Human effigies

Wildlife – Exclusion (Physical Exclusion) pertains to preventing access to resources through fencing or other barriers. Fencing of small critical areas can sometimes prevent animals which cannot climb from entering areas of protected resources. Fencing of culverts, drain pipes, and other water control structures like that used with a Beaver

Deceiver can sometimes prevent beavers from building dams which plug these devices. In those applications, however, consideration must be given for water flow so that the fence does not act to catch and hold water-borne debris. Fencing, especially if it is installed with an underground skirt, can prevent access to areas for many mammal species which dig, including coyotes, foxes, woodchucks, beaver, and muskrat. Areas such as airports, yards or hay meadows may be fenced. Hardware cloth or other metal barriers can sometimes be used to prevent girdling and gnawing of valuable trees and to prevent the entry of mammals into buildings through existing holes or gaps. Applying a mixture of sand in paint can also block beaver from gnawing trees. Construction of concrete spillways may reduce or prevent damage to dams by burrowing aquatic rodent species. Riprap can also be used on dams or levies at times, especially to deter muskrat, woodchucks, and other burrowing rodents. Electrical water barriers have proven effective in limited situations for beaver; an electrical field through the water in a ditch or other narrow channel, or hot-wire suspended just above the water level in areas protected from public access, have been effective at keeping beaver out. The effectiveness of an electrical barrier is extended when used in conjunction with an odor or taste cue that is emitted because beaver will avoid the area even if the electrical field is discontinued (Kolz and Johnson 1997). Similarly, electric fences of various constructions have been used effectively to reduce damage to various crops by deer, raccoons, bears and other species (Hygnstrom and Craven 1994, Boggess 1994).

Beaver Dam Breaching/Removal

Dam breaching involves the removal of debris deposited by beaver that impedes the flow of water. Breaching a beaver dam is generally conducted to maintain existing streams and irrigation channels, restore drainage patterns, and reduce flood waters that have negatively impacted silvicultural, agricultural, residential or ranching/farming activities. Beaver dams removed by WS are normally from recent beaver activity, and sites have not had enough time to develop characteristics of a true wetland (i.e., hydric soils, hydrophytic vegetation, and hydrological function). Unwanted beaver dams may be removed by hand or with explosives. Explosives are used only by WS personnel specially trained and certified to conduct such activities.

Because beaver dams involve waters of the United States, removal is regulated under Section 404 of the CWA (Appendix D). Beaver dam breaching does not affect substrate or natural course of streams. Breaching beaver dams often re-establishes preexisting conditions with similar flows and circulations. Most beaver dam breaching operations, if considered discharge, are covered under 33 CFR 323 or 330 and do not require a permit. A permit would be required if the beaver dam breaching activity is not covered by a 404 permitting exemption or NWP and the area affected by the beaver dam was considered a true wetland. WS personnel survey the site or impoundment to determine if conditions exist for classifying the site as a true wetland. If the site appears to have conditions over 3 years old or appears to meet the definition of a true wetland, the landowner or cooperator is required to obtain a permit before proceeding (See Appendix D for information that explains Section 404 permit exemptions and conditions for breaching/removing beaver dams).

Explosives

Explosives are defined as any chemical mixture or device which serves as a blasting agent or detonator. Explosives are generally used to breach beaver dams that are too large to remove by hand digging and after beaver have been removed from the site. Binary explosives consist of ammonium nitrate and nitro-methane and are not classified as explosives until mixed. Therefore, binary explosives are subject to fewer regulations and controls. However, once mixed, binary explosives are considered high explosives and subject to all applicable federal regulations. Detonating cord and detonators are considered explosives and WS must adhere to all applicable State and federal regulations for storage, transportation, and handling. All WS explosive specialists are required to attend 30 hours of extensive explosive safety training and spend time with a certified explosive specialist in the field prior to obtaining certification. All blasting activities are conducted by well-trained, certified blasters and closely supervised by professional wildlife biologists. Explosive handling and use procedures follow the rules and guidelines set forth by the Institute of Makers of Explosives which is the safety arm of the commercial explosive industry in the United States and Canada. WS also adheres to transportation and storage regulations from State and federal agencies such as Occupational Safety and Health Association, Bureau of Alcohol, Tobacco, and Firearms, and the Department of Transportation.

Relocation of damaging mammals to other areas following live capture generally would not be effective or cost-effective. Relocation to other areas following live capture would not generally be effective because problem bird species are highly mobile and can easily return to damage sites from long distances, habitats in other areas are generally already occupied, and relocation would most likely result in bird damage problems at the new location. Relocated animals can have poor survival rates at the new site (Rosatte and MacInnes 1989, Wright 1978, Frampton and Webb 1974) although careful timing of relocation and selection of release site can markedly improve survival rates (Griffith et al. 1989). Relocating animals also runs the risk of spreading parasites and diseases to previously uninfected areas. For example, the spread of raccoon variant of rabies in the eastern U.S. was likely unintentionally accelerated through the translocation of infected raccoons (Krebs et al. 1999). Translocation of wildlife is discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats.

However, there are exceptions for the relocation of damaging mammals that might be a viable solution, such as when the birds or mammals are considered to have high value such as migratory waterfowl, raptors, or T&E species. Under the right conditions, relocating wildlife can be a viable and effective wildlife management technique (Craven and Kania 1998). Indiana WS would only relocate wildlife at the direction of and only after consulting with the USFWS and/or IDNR to coordinate capture, transportation, and selection of suitable relocation sites, as well as compliance with all proper guidelines.

Animal Capture Devices:

WS specialists can use a variety of devices to capture mammals. For reasons discussed above under Relocation, Captured animals are usually killed via gunshot, cervical dislocation, or one of the chemical euthanasia methods listed below. However there are occasions where captured animals are relocated, or, in the case of some disease surveillance projects, may be released on site.

Leghold traps are small traps that come in a variety of sizes that allows the traps to be species specific of some degree. These traps are used for both mammals and birds and can be set on land or in water. The traps are made of steel with springs to close the jaws of the trap around the foot and leg of the target species. These traps may have steel or padded jaws, which hold the animal. Pan tension devices which increase the pressure required to release the trigger on the trap can reduce risks to nontarget species.

Cage traps are live capture traps used to trap a variety of small to medium sized mammals. Cage traps come in a variety of sizes and are generally made of galvanized wire mesh, and consist of a treadle in the middle of the cage that triggers the door to close behind the animal being trapped. Cage traps can range from the extremely small, intended for the capture of rodents and other small mammals to the large corral/panel traps used to live-capture feral hogs.

Hancock traps (suitcase/basket type cage traps) are designed to live-capture beaver. This type of trap is constructed of a metal frame covered in chain-link fence that is hinged with springs. Trap appearance is similar to a large suitcase when closed. When set, the trap is opened to allow an animal to enter, and when tripped the sides close around the animal.

Colony traps are multi-catch traps used to either live-capture or drown muskrats. There are various types of colony traps. One common type of colony trap consists of a cylindrical tube of wire mesh with a one-way door on each end (Novak 1987b). Colony traps are set at entrances to muskrat burrows or placed in muskrat travel lanes.

Sherman box traps are small live traps used to capture small mammals such as rodents. These traps are often made of galvanized steel or aluminum and fold up for easy transport. Sherman box traps also consist of a treadle towards the back of the trap that triggers the door to close behind the animal being trapped.

Snares are traps made of light cable with a locking device, and are used to catch small and medium sized mammals. The cable is placed in the path of an animal in the form of a loop. When the target species walks into the snare the loop becomes smaller in size, holding the animal as if it were on a leash. When used as a

live capture device, snares are equipped with integrated stops that permit snaring, but do not choke the animal.

Bow nets are small circular net traps used for small mammals. The nets are hinged and spring loaded so that when the trap is set it resembles a half moon. The net is set over a food source and it triggered by an observer using a pull cord.

Hand nets are used to catch small mammals in confined areas such as homes and businesses. These nets resemble fishing dip nets with the exception that they are larger and have long handles

Net guns are devices used to trap mammals. The devices project a net over at target using a specialized gun

NON-LETHAL METHODS – CHEMICAL

Ketamine (Ketamine HCl) is a dissociative anesthetic that is used to capture wildlife, primarily mammals, birds, and reptiles. It is used to eliminate pain, calms fear, and reduces anxiety. Ketamine is possibly the most versatile drug for chemical capture, and it has a wide safety margin (Fowler and Miller 1999). When used alone, this drug may produce muscle tension, resulting in shaking, staring, increased body heat, and, on occasion, seizures. Usually, ketamine is combined with other drugs such as xylazine. The combination of such drugs is used to control an animal, maximize the reduction of stress and pain, and increase human and animal safety.

Telazol (tiletamine) is another anesthetic used in wildlife capture. It is 2.5 to 5 times more potent than ketamine; therefore, it generally works faster and lasts longer. Currently, tiletamine can only be purchased as Telazol, which is a mixture of two drugs: tiletamine and zolazepam (a tranquilizer). Muscle tension varies with species. Telazol produces extensive muscle tension in dogs, but produces a more relaxed anesthesia in coyotes, wolves, and bears. It is often the drug of choice for these wild species (Fowler and Miller 1999). This drug is sold in a powder form and must be reconstituted with sterile water before use. Once mixed with sterile water, the shelf life is four days at room temperature and 14 days if refrigerated.

Xylazine is a sedative (analgesic) that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Xylazine is commonly used with ketamine to produce a relaxed anesthesia. It can also be used alone to facilitate physical restraint. Because xylazine is not an anesthetic, sedated animals are usually responsive to stimuli. Therefore, personnel should be even more attentive to minimizing sight, sound, and touch. When using ketamine/xylazine combinations, xylazine will usually overcome the tension produced by ketamine, resulting in a relaxed, anesthetized animal (Fowler and Miller 1999). This reduces heat production from muscle tension, but can lead to lower body temperatures when working in cold conditions.

Repellents are usually naturally occurring substances or chemicals formulated to be distasteful or to elicit pain or discomfort for target animals when they are smelled, tasted, or contacted. Many repellents are commercially available for mammals, and are registered primarily for herbivores such as rodents and deer. Repellents are not available for many species which may present damage problems, such as some predators or furbearing species. Repellents are variably effective and depend to a great extent on resource to be protected, time and length of application, and sensitivity of the species causing damage. Acceptable levels of damage control are usually not realized unless repellents are used in conjunction with other techniques, as part of an integrated damage management program. In Indiana, repellents must be registered with the OISC. During 2003, a total of 360 mammal repellents are registered with the OISC. The number of repellents registered for various mammal species/species groups are listed here: rabbits (includes Eastern cottontail) (12), white-tailed deer (16), squirrel (6), rodents (9), meadow mice (21), moles (Eastern and star-nosed) (36), field mice (2), house mouse (231), raccoon (7), and meadow vole (20).

Table B.1. List of Example Mammal Repellents Available in IN

Mammal Species	Example Repellents*
White-tailed Deer	Deer-Away Big Game Repellent Deer-Off Repellent Concentrate Hinder Rabbit and Deer Repellent
Squirrel	Miller Hot Sauce Animal Repellent Squirrel Away
Field Mice	Chaperone Rabbit and Deer Repellent
Moles	Scoot Mole Evacuator
Raccoon	Outdoor Animal Repellent
Vole	Miller Hot Sauce Animal Repellent

* All repellents listed may be variably effective in reducing damage and may have other effects on surfaces where applied, and on other animals or plants. Read labels carefully.

LETHAL METHODS - MECHANICAL

For reasons discussed above under Relocation, animals captured using the non-lethal capture methods discussed above are usually killed via gunshot, cervical dislocation, or one of the chemical euthanasia methods listed below. Other lethal mechanical methods are:

Conibear (Body Gripping) Traps are the steel framed traps used to capture and quickly kill aquatic mammals. These traps come in a variety of sizes and may be used on land or in the water depending on size and state and local laws. The traps are made of two steel square frames that are hinged on two sides and have one or two springs. State restrictions on the use of conibear traps are provided in Section 1.8.4.

Shooting is selective for target species and may involve the use of spotlights and either a handgun, shotgun or rifle. Shooting is an effective method to remove a small number of mammals in damage situations. Removal of specific animals in the problem area can sometimes provide immediate relief from a problem. Shooting is sometimes utilized as one of the first lethal damage management options because it offers the potential of resolving a problem more efficiently and selectively than some other methods, but it is not always effective. Shooting may sometimes be one of the only damage management options available if other factors preclude setting of damage management equipment. Firearm use may be a public concern because of issues relating to safety and misuse of firearms. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are required to meet criteria contained in the Lautenberg Amendment which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence. WS activities where shooting is used include, but are not limited to, implementation of Community-Based Deer Management Plans, take of mammals as authorized in Permits to Kill Wild Deer and Special Wildlife Management Permits, and take of mammals in damage situations pursuant to IDNR permits.

Sport Hunting is sometimes recommended by WS as a viable damage management method when the target species can be legally hunted, and activities can meet airport security and safety compliance. A valid hunting license and other licenses or permits may be required by the Indiana Department of Natural Resources (IDNR) and USFWS for certain species. This method provides sport and food for hunters and requires no cost to the landowner. Sport hunting is occasionally recommended if it can be conducted safely for white-tailed deer, coyotes, and other damage causing mammals.

Snap traps are used to remove small rodents and may be modified to remove individual woodpeckers, starlings, and other cavity use birds. The trap treadle is baited with peanut butter or other taste attractants and attached near the damage area. These traps pose no imminent danger to pets or the public.

Cervical Dislocation is sometimes used to euthanize small rodents and birds which are captured in live traps and when relocation is not a feasible option. The animal is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. When done properly, the AVMA approves this technique as humane method of euthanasia and states that cervical dislocation is a humane technique for euthanasia of small rodents, poultry and other small birds (AVMA 2001). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (AVMA 2001).

LETHAL METHODS - CHEMICAL

All chemicals used by WS are registered as required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (administered by the EPA and the Indiana Department of Natural Resources (IDNR) or by the FDA. WS personnel that use restricted-use chemical methods are certified as pesticide applicators by IDNR and are required to adhere to all certification requirements set forth in FIFRA and Indiana pesticide control laws and regulations. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager.

Sodium Pentobarbital is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. There are DEA restrictions on who can possess and administer this drug. Some states may have additional requirements for personnel training and particular sodium pentobarbital products available for use in wildlife. Certified WS personnel are authorized to use sodium pentobarbital and dilutions for euthanasia in accordance with DEA and state regulations.

Zinc Phosphide (ZnP), at concentrations of 0.75% to 2.0% on grain, fruit, or vegetable baits, has been used successfully against such species as meadow mice (voles), ground squirrels, prairie dogs, Norway rats, Polynesian rats, cotton rats and muskrats. ZnP is a heavy, finely ground gray-black powder that is partially insoluble in water and alcohol. When exposed to moisture, it decomposes slowly and releases phosphine gas (PH₃) Phosphine, which is highly flammable, may be generated rapidly if the material comes in contact with dilute acids. ZnP concentrate is a stable material when kept dry and hermetically sealed.

Although zinc phosphate baits have a strong, pungent, phosphorous-like odor (garlic like), this characteristic seems to attract rodents, particularly rats, and apparently makes the bait unattractive to some other animals. For many uses of zinc phosphate formulated on grain or grain-based baits, pre-baiting is recommended or necessary for achieving good bait acceptance.

When zinc phosphate comes into contact with dilute acids in the stomach, phosphate (PH₃) is released. It is this substance that causes death. Animals that ingest lethal amounts of bait usually succumb overnight with terminal symptoms of convulsions, paralysis, coma, and death from asphyxia. If death is prolonged for several days, intoxication that occurs is similar to intoxication with yellow phosphorous, in which the liver is heavily damaged. Prolonged exposure to phosphine can produce chronic phosphorous poisoning.

Because ZnP is not stored in muscle or other tissues of poisoned animals, there is no secondary poisoning with this rodenticide. The bait however, remains toxic up to several days in the gut of the dead rodent. Other animals can be poisoned if they eat enough of the gut content of rodents recently killed with ZnP.

Anticoagulant Rodenticides. Several anticoagulant rodenticides are used to control commensal rodents and some field rodents around building and other structures. Common anticoagulants include warfarin and diphacinone. Anticoagulants are normally classified as multiple-dose toxicants. For the materials to be effective, animals must feed on the bait more than once. However, some newer formulations only require a single feeding to be effective. Bait for rats and mice must be continuously available for 2 to 3 weeks for effective population control.

APPENDIX C

STATE AND FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

COMMON NAME	LATIN NAME	FEDERAL STATUS	STATE STATUS
MAMMALS			
Allegheny woodrat	<i>Neotoma magister</i>		Endangered
Evening bat	<i>Nycticeius humeralis</i>		Endangered
Franklin's ground squirrel	<i>Spermophilus franklinii</i>		Endangered
Gray bat	<i>Myotis grisescens</i>	Endangered	Endangered
Indiana bat	<i>Myotis sodalis</i>	Endangered	Endangered
Southeastern bat	<i>Myotis austroriparius</i>		Endangered
Swamp rabbit	<i>Sylvilagus aquaticus</i>		Endangered
Eastern pipistrelle	<i>Pipistrellus subflavus</i>		Special Concern
Eastern red bat	<i>Lasiurus borealis</i>		Special Concern
Hoary bat	<i>Lasiurus cinereus</i>		Special Concern
Least weasel	<i>Mustela nivalis</i>		Special Concern
Little brown bat	<i>Myotis licifugus</i>		Special Concern
Northern bat	<i>Myotis septentrionalis</i>		Special Concern
Plains pocket gopher	<i>Geomys bursarius</i>		Special Concern
Pygmy shrew	<i>Sorex hoyi</i>		Special Concern
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>		Special Concern
Silver-haired bat	<i>Lasionycteris noctivagans</i>		Special Concern
Smokey shrew	<i>Sorex fumeus</i>		Special Concern
Star-nosed mole	<i>Condylura cristata</i>		Special Concern
BIRDS			
American bittern	<i>Botaurus lentiginosus</i>		Endangered
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	Endangered
Barn owl	<i>Tyto alba</i>		Endangered
Black rail	<i>Laterallus jamaicensis</i>		Endangered
Black tern	<i>Chlidonias niger</i>		Endangered
Black-crowned night heron	<i>Nycticorax nycticorax</i>		Endangered
Common moorhen	<i>Gallinula chloropus</i>		Endangered
Golden-winged warbler	<i>Vermivora chrysoptera</i>		Endangered
Henslow's sparrow	<i>Ammodramus henslowii</i>		Endangered
King rail	<i>Rallus elegans</i>		Endangered
Kirtland's warbler	<i>Dendroica kirtlandii</i>		Endangered
Least bittern	<i>Ixobrychus exilis</i>		Endangered
Least tern	<i>Sterna antillarum</i>	Endangered	Endangered
Loggerhead shrike	<i>Lanius ludovicianus</i>		Endangered
Marsh wren	<i>Cistothorus palustris</i>		Endangered
Northern harrier	<i>Circus cyaneus</i>		Endangered
Osprey	<i>Pandion haliaetus</i>		Endangered
Peregrine falcon	<i>Falco peregrinus</i>		Endangered
Piping plover	<i>Charadrius melodijs</i>	Endangered	Endangered
Sedge wren	<i>Cistothorus platensis</i>		Endangered
Short-eared owl	<i>Asio flammeus</i>		Endangered
Trumpeter swan	<i>Cygnus buccinator</i>		Endangered
Upland sandpiper	<i>Bartramia longicauda</i>		Endangered
Virginia rail	<i>Rallus limicola</i>		Endangered
Whooping crane	<i>Grus Americana</i>	Experimental	Endangered

		Nonessential	
Yellow-crowned night heron	<i>Nyctanassa violacea</i>		Endangered
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>		Endangered
Black-and-white warbler	<i>Mniotilta varia</i>		Special Concern
Broad-winged hawk	<i>Buteo platypterus</i>		Special Concern
Cerulean warbler	<i>Dendroica cerulean</i>		Special Concern
Common nighthawk	<i>Chordeiles minor</i>		Special Concern
Great egret	<i>Ardea alba</i>		Special Concern
Hooded warbler	<i>Wilsonia citrine</i>		Special Concern
Mississippi kite	<i>Ictinia mississippiensis</i>		Special Concern
Red-shouldered hawk	<i>Buteo lineatus</i>		Special Concern
Sandhill crane	<i>Grus Canadensis</i>		Special Concern
Sharp-shinned hawk	<i>Accipiter striatus</i>		Special Concern
Western meadowlark	<i>Stunella neglecta</i>		Special Concern
Whip-poor-will	<i>Caprimulgus vociferous</i>		Special Concern
Worm-eating warbler	<i>Helmitheros vermivorum</i>		Special Concern
AMPHIBIANS			
Crawfish frog	<i>Rana areolata</i>		Endangered
Four-toed salamander	<i>Hemidactylium sculatum</i>		Endangered
Green salamander	<i>Aneides aeneus</i>		Endangered
Hellbender	<i>Cryptobranchus alleganiensis</i>		Endangered
Red salamander	<i>Pseudotriton ruber</i>		Endangered
Blue-spotted salamander	<i>Ambystoma laterale</i>		Special Concern
Eastern spadefoot	<i>Scaphiopus holbrookii</i>		Special Concern
Common mudpuppy	<i>Necturus maculosus</i>		Special Concern
Northern leopard frog	<i>Rana pipens</i>		Special Concern
Plains leopard frog	<i>Rana blairi</i>		Special Concern
REPTILES			
Alligator snapping turtle	<i>Macrochelys temminckii</i>		Endangered
Blanding's turtle	<i>Emydoidea blandingii</i>		Endangered
Butler's garter snake	<i>Thamnophis butleri</i>		Endangered
Copperbelly water snake	<i>Nerodia erythrogaster neglecta</i>		Endangered
Cottonmouth	<i>Agkistrodon piscivorus</i>	Threatened ⁵	Endangered
Eastern mud turtle	<i>Kinosternon subrubrum</i>		Endangered
Hieroglyphic river cooter	<i>Pseudemys concinna</i>		Endangered
Kirtland's snake	<i>Clonophis kirtlandii</i>		Endangered
Massasauga	<i>Sistrurus catenatus</i>	Candidate	Endangered
Ornate box turtle	<i>Terrapene ornate</i>		Endangered
Scarlet snake	<i>Cemophora coccinea</i>		Endangered
Smooth green snake	<i>Liochlorophis vernalis</i>		Endangered
Southeastern crowned snake	<i>Tantilla coronata</i>		Endangered
Spotted turtle	<i>Clemmys guttata</i>		Endangered
Timber rattlesnake	<i>Crotalus horridus</i>		Endangered
Western mud snake	<i>Farancia abacura</i>		Endangered
Rough green snake	<i>Opheodrys aestivus</i>		Special Concern
Western ribbon snake	<i>Thamnophis proximus</i>		Special Concern
FISHES			
Bantam sunfish	<i>Lepomis symmetricus</i>		Endangered
Channel darter	<i>Percina copelandi</i>		Endangered
Gilt darter	<i>Percina evides</i>		Endangered

⁵ Threatened in Northern part of it's range (north of 40 degrees north latitude, roughly Indianapolis). It is not listed in the southern part of its range.

Greater redhorse	<i>Moxostoma valenciennesi</i>		Endangered
Lake sturgeon	<i>Acipenser fulvescens</i>		Endangered
Northern brook lamprey	<i>Ichthyomyzon fossor</i>		Endangered
Northern cavefish	<i>Amblyopsis spelaea</i>		Endangered
Pallid shiner	<i>Hybopsis amnis</i>		Endangered
Redside dace	<i>Clinostomus elongates</i>		Endangered
Variegate darter	<i>Etheostoma variatum</i>		Endangered
Banded pygmy sunfish	<i>Elassoma zonatum</i>		Special Concern
Bigmouth shiner	<i>Notropis dorsalis</i>		Special Concern
Cisco	<i>Coregonus artedii</i>		Special Concern
Cypress darter	<i>Etheostoma proelaire</i>		Special Concern
Lake whitefish	<i>Coregonus clupeaformis</i>		Special Concern
Longnose dace	<i>Rhinichthys cataractae</i>		Special Concern
Longnose sucker	<i>Catostomus catostomus</i>		Special Concern
Northern madtom	<i>Noturus stigmosus</i>		Special Concern
Ohio River Muskellunge	<i>Esox masquinongy ohioensis</i>		Special Concern
Pugnose shiner	<i>Notropis anogenus</i>		Special Concern
Slimy sculpin	<i>Cottus cognatus</i>		Special Concern
Spotted darter	<i>Etheostoma maculatum</i>		Special Concern
Tippecanoe darter	<i>Etheostoma Tippecanoe</i>		Special Concern
Trout-perch	<i>Percopsis omiscomaycus</i>		Special Concern
Western sand darter	<i>Ammocrypta clara</i>		Special Concern
MOLLUSKS			
Clubshell	<i>Pleurobema clava</i>	Endangered	Endangered
Eastern fanshell	<i>Cyprogenia stegaria</i>	Endangered	Endangered
Fat pocketbook	<i>Potamilus capax</i>	Endangered	Endangered
Longsolid	<i>Fusconaia subrotunda</i>		Endangered
Northern riffleshell	<i>Epioblasma tortulosa rangiana</i>	Endangered	Endangered
Orangefoot pimpleback	<i>Plethobasus cooperianus</i>		Endangered
Pink mucket	<i>Lampsilis abrupta</i>		Endangered
Pyramid pigtoe	<i>Pleurobema rubrum</i>		Endangered
Rabbitsfoot	<i>Quadrula cylindrical cylindrica</i>		Endangered
Rough pigtoe	<i>Pleurobema plenum</i>	Endangered	Endangered
Sheepnose	<i>Plethobasus cyphus</i>	Candidate	Endangered
Snuffbox	<i>Epioblasma trequetra</i>		Endangered
Tubercled blossom	<i>Epioblasma torulosa torulosa</i>		Endangered
White catspaw	<i>Epioblasma obliquata perobliqua</i>	Endangered	Endangered
White wartyback	<i>Plethobasus cicatricosus</i>		Endangered
Ellipse	<i>Venustaconcha ellipsiformis</i>		Special Concern
Kidneyshell	<i>Ptychobranchus fasciolaris</i>		Special Concern
Little spectaclecase	<i>Villosa lienosa</i>		Special Concern
Ohio pigtoe	<i>Pleurobema cordatum</i>		Special Concern
Pointed cameloma	<i>Cameloma decisum</i>		Special Concern
Purple lilliput	<i>Toxolasma lividus</i>		Special Concern
Rayed bean	<i>Villosia fabalis</i>	Candidate	Special Concern
Round hickorynut	<i>Obovaria subrotunda</i>		Special Concern
Salamander mussel	<i>Simpsonaias ambigua</i>		Special Concern
Swamp lymnaea	<i>Lymnaea stagnalis</i>		Special Concern
Wavyrayed lampmussel	<i>Lampsilis fasciola</i>		Special Concern
INSECTS⁶			
Karner blue butterfly	<i>Lycaeides Melissa samuelis</i>	Endangered	

⁶ Indiana's Endangered Species law excludes insects and plants from protection.

Mitchell's satyr butterfly	<i>Neonympha mitchellii mitchellii</i>	Endangered	
PLANTS⁷			
Eastern prairie fringed orchid	<i>Plantathera leucophaea</i>	Threatened	
Mead's milkweed	<i>Asclepias meadii</i>	Threatened	
Pitcher's thistle	<i>Cirsium pitcheri</i>	Threatened	
Running buffalo clover	<i>Trifolium stoloniferum</i>	Endangered	
Short's bladderpod	<i>Lesquerella globosa</i>	Candidate	
Short's goldenrod	<i>Solidago shortii</i>	Endangered	

APPENDIX D

CRITERIA FOR BEAVER DAM BREACHING/REMOVAL

Beaver dam breaching/removal is generally conducted to maintain existing stream channels and drainage patterns and/or to reduce flood waters. Beaver dams are usually made from natural debris such as logs, sticks, and mud. However, beaver are opportunistic when it comes to materials for dam construction and dams may contain man-made materials such as tires, plastic pipe, or plywood. When beaver dams are breached, the material is removed from the approximate center of the dam or the area closest to the existing channel. The dams that WS removes are normally the result of recent beaver activity and the resulting ponds have not been in place long enough to generate characteristics of a true wetland (i.e., hydric soils, hydrophytic vegetation, and hydrology). Beaver dam breaching/removal by hand or with binary explosives does not affect the substrate or the natural course of the stream and returns the area back to its preexisting condition with similar flows and circulations. Because beaver dams involve waters of the United States, dam breaching/removal is regulated under Section 404 of the CWA.

Wetlands are recognized by three characteristics: hydric soils, hydrophytic vegetation, and general hydrology. Hydric soils are either composed of, or have a thick surface layer of, decomposed plant materials (muck); sandy soils have dark stains or streaks from organic material in the upper layer where plant material has attached to soil particles. Hydric soils may be bluish gray or gray below the surface or brownish black to black and commonly smell of rotten eggs. Wetlands also have hydrophytic vegetation present such as cattails, bulrushes, willows (*Salix* sp.), sedges (*Carex* sp.), and water plantains (*Alismataceae*). A final indicator is general hydrology which includes standing and flowing water or waterlogged soils during the growing season; high water marks often are present on trees and drift lines of small piles of debris are usually present. Beaver dams usually will develop a layer of organic material at the surface. Silt deposits can occur rapidly, but aquatic vegetation and high water marks (a new high water mark is created by the beaver dam) are usually not present. However, cattails and willows can show up rapidly if they are in the vicinity, but most hydrophytic vegetation takes time to establish.

In most beaver dam breaching/removal operations, the material that is displaced is exempt from permitting or included in a Nationwide Permit (NWP) in accordance with Section 404 of the CWA (33 CFR Part 323). A permit would be required if the impoundment caused by a beaver dam was not covered under a NWP or permitting exemption and was a true wetland. WS biologists and specialists survey the beaver dam site and impoundment to determine if conditions exist for classifying the site as a true wetland. If wetland conditions exist, the landowner or cooperator is asked the approximate age of the dam or how long he/she has known of its presence. This information is useful in determining if Swampbuster, Section 404 permit exemptions, or nationwide permits will allow breaching/removal of the beaver dam. If it is determined that a dam cannot be removed or breached under provisions provided by Swampbusters, 404 permit exemption or NWP, the landowner or cooperator is responsible for obtaining a Section 404 permit before the dam could be breached/removed by WS. The following explains Section 404 exemptions and conditions that pertain to the breaching/removal of beaver dams.

33 CFR 323 - Permits For Discharges of Dredged or Fill Material into Waters of the United States. This regulation provides guidance to determine whether certain activities require permits under Section 404.

Part 323.4 Discharges not requiring permits. This section establishes exemptions for discharging certain types of fill into waters of the United States without a permit. Certain minor drainage activities connected with normal farming, ranching, and silvicultural practices do not require a permit as long as these drainages do not include the immediate or gradual conversion of a wetland (i.e., beaver ponds greater than 3 years old) to a non-wetland. Specifically, part (a)(1)(iii)(C)(i) states, “...fill material incidental to connecting upland drainage facilities (e.g., drainage ditches) to waters of the United States, adequate to effect the removal of excess soil moisture from upland croplands...”. This indicates that beaver dams that block ditches, canals, or other structures designed to drain water from upland crop fields can be breached without a permit.

Moreover, (a)(1)(iii)(C)(iv) states the following types of activities do not require a permit. *“The discharges of dredged or fill materials incidental to the emergency removal of sandbars, gravel bars, or other similar blockages which are formed during flood flows or other events, where such blockages close or constrict previously existing drainage ways and, if not promptly removed, would result in damage to or loss of existing crops or would impair or prevent the plowing, seeding, harvesting or cultivating of crops on land in established use for crop production. Such removal does not include enlarging or extending the dimensions of, or changing the bottom elevations of, the affected drainage way as it existed prior to the formation of the blockage. Removal must be accomplished within one year of discovery of such blockages in order to be eligible for exemption.”* This allows the breaching of beaver dams in natural streams to restore drainage of agricultural lands within one year of discovery.

Part 323.4 (a)(2) allows *“Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption.”* This allows beaver dams to be breached without a permit where they have resulted in damage to roads, culverts, bridges, or levees if it is done in a reasonable amount of time.

33 CFR 330 – Nationwide Permit (NWP) Program

The USACE, Chief of Engineers is authorized to grant certain dredge and fill activities on a nationwide basis if they have minimal impact on the environment. NWP are listed in Appendix A of 33 CFR 330 and those permitted must satisfy all terms and conditions established to qualify for their use. Individual beaver dam breaching by WS may be covered by any of the following NWP if not already exempted from permit requirements by the regulations discussed above. WS complies with all conditions and restrictions placed on NWP for any instance of beaver dam breaching/removal done under a specific NWP.

Nationwide permits can be used **except** in any component of the National Wild and Scenic River System such as waterways listed as an *“Outstanding Water Resource”*, or any water body which is part of an area designated for *“Recreational or Ecological Significance”*.

NWP 3 authorizes the rehabilitation of those structures, such as culverts, homes, and bridges, destroyed by floods and “discrete events,” such as beaver dams, provided that the activity is commenced within 2 years of the date when the beaver dam was established.

NWP 18 allows minor discharges of dredged and fill material, including the breaching of beaver dams, into all waters of the United States provided that the quantity of discharge and the volume of excavated area does not exceed 10 cubic yards below the plane of the ordinary high water mark (this is normally well below the level of the beaver dam) or is in a “special aquatic site” (wetlands, mudflats, vegetated shallows, riffle and pool complexes, sanctuaries, and refuges). The District Engineer must be “notified” (general conditions for notification apply), if the discharge is between 10-25 cubic yards for a single project or the project is in a special aquatic site and less than $\frac{1}{10}$ of an acre is expected to be lost. If the values are greater than those given, a permit is required. Beaver dams rarely would exceed 2 or 3 cubic yards of backfill into the waters and probably no more than 5 cubic yards would ever be exceeded. Therefore, this stipulation is not restrictive. Beaver dams periodically may be breached in a special aquatic area, but normally the aquatic site will be returned to normal. However, if a true wetland exists, and beaver dam breaching/removal is not allowed under another permit, then a permit must be obtained from the District Engineer.

NWP 27 provides for the discharge of dredge and fill for activities associated with the restoration of wetland and riparian areas with certain restrictions. On non-federal public and private lands, the owner must have: a binding agreement with USFWS or NRCS to conduct restoration; a voluntary wetland restoration project documented by NRCS; or notify the District Engineer according to “notification” procedures. On federal lands, including USACE and USFWS, wetland restoration can take place without

any contract or notification. This NWP *“...applies to restoration projects that serve the purpose of restoring “natural” wetland hydrology, vegetation, and function to altered and degraded non-tidal wetlands and “natural” functions of riparian areas. This NWP does not authorize the conversion of natural wetlands to another aquatic use...”* If operating under this permit, the breaching/removal of a beaver dam would be allowed as long as it was not a true wetland. Non-federal public and private lands require the appropriate agreement, project documentation, or notification to be in place.

A quick response without delays resulting from permitting requirements can be critical to the success of minimizing or preventing aquatic rodent damage. Damage often escalates the longer an area remains flooded. Exemptions contained in the above regulations or NWP provide for the breaching/removal of the majority of beaver dams that Missouri WS encounters. The primary determination that must be made by WS personnel is whether a beaver impounded area meets the criteria to be classified as a true wetland or is the area a more recently flooded site lacking true wetland characteristics. Flexibility allowed by these exemptions and NWP is important for the efficient and effective resolution of many beaver damage problems.